

## Professor Graham Hutchings: Publications

### Refereed research papers

1. G.J. Hutchings, B.E.C. Banks, M. Mruzek, J.H. Ridd and C.A. Vernon. 'Mechanisms of hydrolysis of adenosine-5'-triphosphate, adenosine-5'-diphosphate, and Inorganic Pyrophosphate in Aqueous Perchloric Acid', *Biochem.*, **20** (1981) 5809-5816.
2. G.J. Hutchings, 'Factors affecting the adsorption of mercury (II) chloride onto carbon', *S. Afr. J. Chem.*, **38** (1985) 25-30.
3. G.J. Hutchings, 'An electron microscopy study of catalysts for the production of hydrogen cyanide by the ammoxidation of methane', *S. Afr. J. Chem.*, **38** (1985) 44-48.
4. G.J. Hutchings and D.T. Grady, 'Effect of drying conditions on carbon supported mercuric chloride catalysts', *Appl. Catal.*, **16** (1985) 411-415.
5. R.G. Copperthwaite, G.J. Hutchings, S.W. Orchard and P. Johnston, 'Ozone reactivation of a synthetic zeolite catalyst for methanol conversion', *J. Chem. Soc., Chem Commun.*, (1985) 644-645.
6. G.J. Hutchings and D.T. Grady, 'Hydrochlorination of acetylene: The effect of mercuric chloride concentration on catalyst lifetime', *Appl. Catal.*, **17** (1985) 155-160.
7. G.J. Hutchings and R.E. Espinoza, 'Comments on the classification of Fischer-Tropsch synthesis product distributions', *Can. J. Chem. Eng.*, **63** (1985) 695-697.
8. R. Hunter and G.J. Hutchings, 'LiAl(O<sup>i</sup>Pr)<sub>4</sub> as a model compound for the conjugate base of the zeolite catalyst H-ZSM-5 and its reaction with various methylating agents', *J. Chem. Soc., Chem. Commun.*, (1985) 886-887.
9. G.J. Hutchings, 'Vapour phase hydrochlorination of acetylene: Correlation of catalytic activity of supported metal chloride catalysts', *J. Catal.*, **96** (1985) 292-295
10. G.J. Hutchings and G. Fraser-Bell, 'Purification and utilisation of iron contaminated sulphuric acid', *J. Chem. Tech. Biotech.*, **35A**, (1985) 403-406.
11. R. Hunter and G.J. Hutchings, 'Hydrocarbon formation from methylating agents over the zeolite catalyst H-ZSM-5 and its conjugate base: Evidence against the trimethyloxonium ion-ylide mechanism', *J. Chem. Soc., Chem. Commun.*, (1985) 1643-1645.
12. R.G. Copperthwaite, H. Hack, G.J. Hutchings and J.P.F. Sellschop, 'X-ray photoelectron spectroscopic evidence for iron enrichment on doped manganese oxide surfaces', *Surface Science*, **164** (1985) L827-L830.
13. G.J. Hutchings and R. Joffe, 'A novel process for the co-synthesis of vinyl chloride monomer and sodium carbonate', *Appl. Catal.*, **20** (1986) 215-218.
14. R.G. Copperthwaite, G.J. Hutchings and M. van der Reit, 'Preparation and evaluation of a synthetic zeolite catalyst', *J. Chem. Educ.*, **63** (1986) 632-634.
15. R.G. Copperthwaite, G.J. Hutchings, P. Johnston and S.W. Orchard, 'Methanol conversion to hydrocarbons using zeolite catalysts', *J. Chem. Educ.*, **63** (1986) 634-637
16. R.G. Copperthwaite, G.J. Hutchings, P. Johnston and S.W. Orchard, 'Reactivation of zeolite catalysts using ozone and oxygen', *J. Chem. Soc., Farad. Trans. 1.*, **82** (1986) 1007-1017.
17. G.J. Hutchings, R.G. Copperthwaite, 'Production of liquid fuels using zeolites', *S. Afr. J. Sci.*, **81** (1985) 537-540.
18. G.J. Hutchings, 'Catalyst crushing strength as a diagnostic test', *J. Chem. Tech. Biotech.*, **36** (1986) 255-258.
19. P. Johnston, G.J. Hutchings and M.J. Coville, 'Site selectivity studies on metal dimer complexes: The substitution reaction of [( $\eta^5$ -C<sub>5</sub>H<sub>5</sub>)Fe(CO)<sub>2</sub>Mn(CO)<sub>5</sub>]', *Inorg. Chem. Acta.*, **117** (1986) L11-L12.
20. G.J. Hutchings, M.V.M. Hall and R. Hunter, 'Hydrocarbon formation over ZSM-5 using model reagents: Comments on the primary products', *J. Catal.*, **101** (1986) 224-226.
21. G.J. Hutchings and J.C.A. Boeyens, 'Effects of iron manganese oxide solid solutions on selectivity for lower hydrocarbons from carbon monoxide hydrogenation', *J. Catal.*, **100** (1986) 507-511.
22. M. van der Riet, G.J. Hutchings and R.G. Copperthwaite, 'Selective formation of C<sub>3</sub> hydrocarbons from CO + H<sub>2</sub> using cobalt manganese oxide catalysts', *J. Chem. Soc., Chem. Commun.*, (1986) 798-799.

23. L. Carlton, R.G. Copperthwaite, G.J. Hutchings and E. Reynhardt, 'Characterisation of carbonaceous residues on the pentasil zeolite ZSM-5 following reactivation: A solid state  $^{13}\text{C}$  nmr spectroscopic study', *J. Chem. Soc., Chem. Commun.*, (1986) 1008-1009.
24. R. Hunter and G.J. Hutchings, 'Reaction of ethyl diazoacetate with the zeolite catalyst H-ZSM-5: A model study of carbon carbon bond formation', *J. Chem. Soc., Chem. Commun.*, (1986) 1006-1008.
25. G.J. Hutchings, F.M. Gottschalk, M.V.M. Hall and R. Hunter, 'Hydrocarbon formation from methylating agents over the zeolite catalyst ZSM-5: Comments on the mechanism of carbon-carbon bond and methane formation', *J. Chem. Soc., Farad. Trans. 1*, **83** (1987) 571-581.
26. G.J. Hutchings and R. Hunter, 'Methanol conversion to hydrocarbons: Comments on the mechanism of carbon carbon bond formation', *S. Afr. J. Sci.*, **82** (1986) 350-353.
27. R.G. Copperthwaite, G.J. Hutchings, M. van der Riet and J. Woodhouse. 'Comparative study of hydrogenation of carbon monoxide to hydrocarbons on an iron vanadia and iron alumina catalyst', *S. Afr. J. Chem.*, **39** (1986) 251-254.
28. G.J. Hutchings, 'A study of supported platinum catalysts for the production of hydrogen cyanide by the ammoxidation of methane', *Appl. Catal.*, **28** (1986) 7-11.
29. R.G. Copperthwaite, G.J. Hutchings and M. van der Riet, 'Modification Co catalysts using manganese oxide', *S. Afr. J. Sci.*, **82** (1986) 596-597.
30. R.G. Copperthwaite, G.J. Hutchings, M. van der Reit and J. Woodhouse, 'Carbon monoxide hydrogenation using manganese oxide-based catalysts: Effects of operating conditions on alkene selectivity', *Ind. Eng. Chem. Res.*, **26** (1987) 869-874.
31. G.J. Hutchings, F. Gottschalk and R. Hunter, 'Comments on "Kinetic model for methanol conversion to Olefins" with respect to methane formation at low conversion', *Ind. Eng. Chem. Res.*, **26** (1987) 635-637.
32. P. Johnston, G. Hutchings, J.C.A. Boeyens, L. Denner and N. Coville, 'Reactivity of mixed metal dimers: Ligand substitution reactions of  $[\eta^5\text{-C}_5\text{H}_5]\text{M}(\text{CO})_2\text{M}'(\text{CO})_5]$ , M = Fe, M' = Mn, R', *Organometallics*, **6** (1987) 1292-1300.
33. R. Hunter and G.J. Hutchings, 'Hydrocarbon formation from methanol using  $\text{WO}_3/\text{Al}_2\text{O}_3$  and zeolite H-ZSM-5 catalysts: Further evidence on the reaction mechanism', *J. Chem. Soc., Chem. Commun.*, (1987) 337-379.
34. R. Hunter, G.J. Hutchings and W. Pickl, 'Mechanistic studies on initial C-C bond formation in the zeolite ZSM-5 catalysed methanol conversion reaction: Evidence against a radical pathway', *J. Chem. Soc., Chem. Commun.*, (1987) 843-844.
35. R.G. Copperthwaite, G. Foulds, T. Themistocleous and G.J. Hutchings, 'Nitrous oxide reactivation of a zeolite Y catalyst for hydrocarbon cracking', *J. Chem. Soc., Chem. Commun.*, (1987) 748-749.
36. M. van der Riet, R.G. Copperthwaite and G.J. Hutchings, 'Formation of hydrocarbons from  $\text{CO}+\text{H}_2$  using a cobalt manganese oxide catalyst: A  $^{13}\text{C}$  isotopic study', *J. Chem. Soc., Faraday Trans. 1*, **83** (1987) 2963-2972.
37. G.J. Hutchings, R.G. Copperthwaite, T. Themistocleous, G.A. Foulds, A.S. Bielovitch, B.J. Loots, G. Nowitz and P. van Eck, 'A comparative study of reactivation of zeolite Y using oxygen and ozone/oxygen mixtures', *Appl. Catal.*, **34** (1987) 153-161.
38. P.M. Loggenberg, L. Carlton, R.G. Copperthwaite and G.J. Hutchings, 'The reaction of diazomethane with co-absorbed carbon monoxide on an iron surface: the formation of carbon carbon bonds', *J. Chem. Soc., Chem. Commun.*, (1987) 541-543.
39. P.M. Loggenberg, L. Carlton, R.G. Copperthwaite and G.J. Hutchings, 'The interaction of diazomethane and its decomposition products with a polycrystalline iron surface, studied by X-ray photoelectron spectroscopy', *Surf. Sci.*, **184** (1987) L339-L344.
40. G.J. Hutchings, R.G. Copperthwaite and N.J. Coville, 'Catalysis of hydrocarbon formation and transformation', *S. Afr. J. Sci.*, **84** (1988) 12-16.
41. L. Carlton, R.G. Copperthwaite, G.J. Hutchings and P.M. Loggenberg, 'Preparation of diazomethane and its application in surface mechanistic studies of the Fischer-Tropsch reaction', *S. Afr. J. Chem.*, **40** (1987) 203-204.
42. G.J. Hutchings, M.S. Scurrrell and J.R. Woodhouse, 'The role of surface O- in the selective oxidation of methane', *J. Chem. Soc., Chem. Commun.*, (1987) 1388-1389.

43. G.J. Hutchings, M.S. Scurrrell and J.R. Woodhouse, 'Effects of O<sub>3</sub> versus O<sub>2</sub> as oxidants for methane', *Stud. Surf. Sci. and Catal.*, **36** (1988) 415-419.
44. G.J. Hutchings, R. Hunter, W. Pickl and L. Jansen van Rensburg, 'Hydrocarbon formation from methanol using WO<sub>3</sub>/Al<sub>2</sub>O<sub>3</sub> and zeolite H-ZSM-5 catalysts: A mechanistic study', *Stud. Surf. Sci. Catal.*, **36** (1988) 183-187.
45. R. Hunter, G.J. Hutchings and W. Pickl, 'Methanol conversion to hydrocarbons over the zeolite catalyst ZSM-5 in the presence of added O<sub>2</sub> and NO: Further evidence against a radical reaction mechanism', *J. Chem. Soc., Chem. Commun.*, (1987) 1369-1371.
46. G.J. Hutchings, L. Jansen van Rensburg, W. Pickl and R. Hunter, 'Hydrocarbon formation from methanol and dimethyl ether using WO<sub>3</sub>/Al<sub>2</sub>O<sub>3</sub> and H-ZSM-5 catalysts: A mechanistic investigation using model reagents', *J. Chem. Soc., Faraday Trans. 1*, **84** (1988) 1311-1328.
47. G.J. Hutchings, M.S. Scurrrell and J.R. Woodhouse, 'Direct partial oxidation of methane: effect of oxidant on the reaction', *Appl. Catal.*, **38** (1988) 157-165.
48. G.J. Hutchings, M.S. Scurrrell and J.R. Woodhouse, 'Comparison of ethene and ethane primary selectivities with Li/MgO and MgO catalysts for oxidative coupling: comments on the role of Li', *J. Chem. Soc., Chem. Commun.*, (1987) 1862-1863.
49. G.J. Hutchings, M.S. Scurrrell and J.R. Woodhouse, 'The role of gas phase reaction in the selective oxidation of methane', *J. Chem. Soc., Chem. Commun.*, (1988) 253-255.
50. G.J. Hutchings, M.S. Scurrrell and J.R. Woodhouse, 'Direct partial oxidation of methane: strategy for catalyst selection', *Proc. Int. Coal Gas Conf.* (CSIR, S Africa), 1987, 337-345.
51. G.J. Hutchings, M. van der Riet and R.G. Copperthwaite, 'CO hydrogenation using cobalt manganese oxide catalysts', *Proc. Int. Coal Gas Conf.* (CSIR, S Africa), 1987, 150-164.
52. F.M. Gottschalk, R.G. Copperthwaite, M. van der Riet and G.J. Hutchings, 'Cobalt Manganese Oxide water gas shift catalysts I. Competition between carbon monoxide hydrogenation and water gas shift activity', *Appl. Catal.*, **38** (1988) 103-108.
53. F. M. Gottschalk and G. J. Hutchings, 'Cobalt Manganese Oxide: A novel high activity water gas shift catalyst', *J. Chem. Soc., Chem. Commun.*, (1988) 123-124.
54. B. Nkosi, N. J. Coville and G. J. Hutchings, 'Reactivation of a supported gold catalyst for acetylene hydrochlorination', *J. Chem. Soc., Chem. Commun.*, (1988) 71-72.
55. M. van der Riet, R.G. Copperthwaite, R. Hunter and G.J. Hutchings, 'CO hydrogenation in the presence of added oxygen: New evidence on the reaction mechanism', *J. Chem. Soc., Chem. Commun.*, (1988) 512-513.
56. L. Jansen van Rensburg, R. Hunter and G.J. Hutchings, 'Methanol conversion to hydrocarbons: primary versus secondary formation of methane and ethene', *Appl. Catal.*, **42** (1988) 29-34.
57. G.J. Hutchings, R. Hunter and L. Jansen van Rensburg, 'Methanol and dimethyl ether conversion to hydrocarbons using tungsten trioxide/alumina as catalyst: A study of catalyst reactivation', *Appl. Catal.*, **41** (1988) 253-259.
58. B. Nkosi, N.J. Coville and G.J. Hutchings, 'Vapour phase hydrochlorination of acetylene with Group VIII and 1B metal chloride catalysts', *Appl. Catal.*, **43** (1988) 33-39.
59. S. Colley, R.G. Copperthwaite, G.J. Hutchings and M. van der Riet, 'Carbon Monoxide Hydrogenation using Cobalt Manganese Oxide Catalysts: Initial catalyst optimisation studies', *Ind. Eng. Chem. Res.*, **27** (1988) 1339-1344.
60. M. van der Riet, R.G. Copperthwaite, S.F. Demarger and G.J. Hutchings, 'Selective hydrogenation of carbon monoxide to oxygenates by use of a novel iron catalyst', *J. Chem. Soc., Chem. Commun.*, (1988) 667-668.
61. G.J. Hutchings, F. Gottschalk, R. Hunter and S.W. Orchard, 'Cobalt Manganese oxide water gas shift catalysts: A kinetic and mechanistic study', *J. Chem. Soc., Faraday Trans. 1*, **85** (1989) 363-371.
62. G.J. Hutchings, T. Themistocleous and R.G. Copperthwaite, 'Methanol conversion to hydrocarbons using modified clinoptilolite: Investigation of catalyst lifetime and reactivation', *Appl. Catal.*, **43** (1988) 133-140.
63. G.J. Hutchings, J.R. Woodhouse and M.S. Scurrrell, 'Partial oxidation of methane using O<sub>3</sub>, N<sub>2</sub>O and O<sub>2</sub> as oxidants: A comparative study', *Proc. 9th Int. Cong. Catal.*, Calgary 1988, Vol. 2, 923-929.

64. G.J. Hutchings, H. Comminos, R.G. Copperthwaite, L. Jansen van Rensburg, R. Hunter and T. Themistocleous; 'Reactivation of zeolite and oxide catalysts using nitrous oxide', *J. Chem. Soc., Faraday Trans. 1*, **85** (1989) 633-644.
65. G.J. Hutchings, T. Themistocleous and R.G. Copperthwaite, 'Methanol conversion to hydrocarbons using a modified South African clinoptilolite catalyst: Investigation of catalyst lifetime', *S. Afr. J. Chem.*, **41** (1988) 157-160.
66. G.J. Hutchings, M.S. Scurrall and J.R. Woodhouse, 'Partial oxidation of methane over samarium and lanthanum oxides: A study of the reaction mechanism', *Catal. Today*, **4** (1989) 371-381.
67. G.J. Hutchings, M. van der Riet and R. Hunter, 'CO hydrogenation using cobalt/manganese oxide catalysts: Comments on the reaction mechanism of carbon-carbon bond formation', *J. Chem. Soc., Faraday Trans. 1*, **85** (1989) 2875-2890.
68. G.J. Hutchings, J.R. Woodhouse and M.S. Scurrall, 'Partial oxidation of methane using oxide catalysts: Comments on the reaction mechanism', *J. Chem. Soc., Faraday Trans. 1*, **85** (1989) 2507-2523.
69. F.M. Gottschalk and G.J. Hutchings, 'Cobalt Manganese Water Gas Shift Catalysts Initial Optimisation Studies', *Appl. Catal.*, **51** (1989) 127-139.
70. G.J. Hutchings, M.S. Scurrall and J.R. Woodhouse, 'Selective oxidation of methane in the presence of NO: new evidence on the reaction mechanism', *J. Chem. Soc., Chem. Commun.*, (1989) 765-766.
71. P. Johnston, G.J. Hutchings and N.J. Coville, 'Site selectivity studies on the catalysed reaction of isotopically labelled  $\text{MnRe}(\text{CO})_{10}$  with  $^t\text{BuNc}$ . Implications for metal dimer and cluster reactions', *J. Amer. Chem. Soc.*, **111** (1989) 1902-1903.
72. G.J. Hutchings, L. Jansen van Rensburg, R.G. Copperthwaite, R. Hunter, J. Dwyer and J. Dewing, 'Methanol conversion to hydrocarbons over H-ZSM-5: further evidence for the role of NO', *Catal. Lett.*, **4** (1990) 7-14.
73. G.J. Hutchings and G. Buckles, 'Modification of zeolite Y by tungsten oxide', *Stud. Surf. Sci. Catal.*, **47** (1989) 1413-1422
74. G.J. Hutchings, M.S. Scurrall and J.R. Woodhouse, 'Selective oxidation of methane in the presence of nitric oxide: Comments on the reaction mechanism', *Catal. Today*, **6** (1990) 399-407.
75. J.S.J. Hargreaves, G.J. Hutchings and R.W. Joyner, 'Structural aspects of the oxidative coupling of methane', *Catal. Today*, **6** (1990) 481-488.
76. S.E. Colley, R.G. Copperthwaite, G.J. Hutchings, S.P. Terblanch and M.M. Thackaray, 'Identification of body-centred cubic cobalt and its importance in CO hydrogenation', *Nature*, **339** (1989) 129-130.
77. M. Allen, R. Betteley, M. Bowker and G.J. Hutchings, 'The partial oxidation of propene on Fe/Sb oxide catalysis', *Catal. Today*, **9** (1991) 97-104.
78. G.J. Buckles, G.J. Hutchings and C.D. Williams, 'Propane conversion over zeolite catalysts: comments on the role of Ga', *Catal. Lett.*, **8** (1991) 115-124.
79. R.G. Copperthwaite, F.M. Gottschalk, T. Sangiorgio and G.J. Hutchings, 'Cobalt chromium oxide: a novel sulphur tolerant water gas shift catalyst', *Appl. Catal.*, **63** (1990) L11-L16.
80. J.S.J. Hargreaves, G.J. Hutchings and R.W. Joyner, 'Control of product selectivity in the partial oxidation of methane', *Nature*, **348** (1990) 428-429.
81. G.J. Hutchings and P. Johnston, 'Methanol conversion to hydrocarbons: investigation of the possible role of carbon monoxide in the formation of the initial carbon carbon bond', *Appl. Catal.*, **67** (1990) L5-L9.
82. G.J. Hutchings, D.F. Lee and C.D. Williams, 'Catalytic conversion of allyl alcohol to acetone over the zeolite H-ZSM-5', *Chem. Commun.*, (1990) 1475-1476.
83. G.J. Hutchings, M.S. Scurrall and J.R. Woodhouse, 'Oxidative coupling of methane using Li/MgO catalyst: re-appraisal of the optimum loading of Li', *Catal. Letts.*, **5** (1990) 301- 308.
84. B. Nkosi, M.D. Adams, N.J. Coville and G.J. Hutchings, 'Hydrochlorination of acetylene using carbon-supported gold catalysts: a study of catalyst reactivation', *J.Catal.*, **128** (1991) 378-386.
85. B. Nkosi, N.J. Coville, G.J. Hutchings, M.D. Adams, J. Friedl and F.E. Wagner, 'Hydrochlorination of acetylene using gold catalysts: a study of catalyst deactivation', *J. Catal.*, **128** (1991) 366-377.
86. J.S.J. Hargreaves, G.J. Hutchings and R.W. Joyner, 'Hydrogen production in methane coupling over magnesium oxide', *Stud. Surf. Sci. Catal.*, **61** (1991) 155-159.

87. G.J. Hutchings, 'Studies on the mechanism of formation of the initial carbon-carbon bond in the methanol conversion reaction over zeolite catalyst H-ZSM-5: A comparison of NO and NH<sub>3</sub> as catalyst poisons', *Stud. Surf. Sci. Catal.*, **61** (1991) 405-412.
88. S.E. Colley, R.G. Copperthwaite and G.J. Hutchings 'Unusual cobalt phases in CO-hydrogenation catalysts, studied by in-situ X-ray diffraction', *Catal. Today*, **9** (1991) 203-209.
89. G.J. Hutchings, D.F. Lee and C.D. Williams, 'Conversion of allyl alcohol to oxygenated products over zeolite catalysts', *Stud. Surf. Sci. Catal.*, **69** (1991) 389-395.
90. G.J. Hutchings, M. Bowker, A. Crossley, M. Allen and R. Betteley, 'The oxidation and ammoxidation of propene over Fe/Sb catalysts', *Catal. Today*, **10** (1991) 413-416.
91. J.S.J. Hargreaves, G.J. Hutchings, R.W. Joyner and C.J. Kiely, 'Structural aspects of magnesium oxide catalysts for the oxidative coupling of methane', *Catal. Today*, **10** (1991) 259-265.
92. G.J. Buckles, G.J. Hutchings and C.D. Williams, 'Aromatization of propane over Ga/H-ZSM-5: An explanation of the synergy observed between Ga<sup>3+</sup> and H<sup>+</sup>', *Catal. Lett.*, **11** (1991) 89-94
93. J.S.J. Hargreaves, G.J. Hutchings, R.W. Joyner and C.J. Kiely, 'Relationship between morphology and catalytic performance of lithium and gold doped magnesium oxide catalysts for the oxidative coupling of methane', *Catal. Today*, **13** (1991) 401-407.
94. S.E. Colley, M.J. Betts, R.G. Copperthwaite, G.J. Hutchings and N.J. Coville, 'CO hydrogenation using Co-MnO catalysts: the influence of K as a promoter', *J. Catal.*, **134** (1992) 186-203.
95. M. Yu. Sinev, Yu. P. Tulenin, G.J. Hutchings, R.W. Joyner, M.R.H. Siddiqui, C.J. Kiely and R.W. Devenish, 'Structural aspects of MgO/Nd<sub>2</sub>O<sub>3</sub> catalysts for the oxidative coupling of methane', *Prepr. ACS, Symposium in Natural Gas Upgrading, Div. Petr. Chem. San Francisco*, **37** (1992) 80-84.
96. J. Friedl, F.E. Wagner, B. Nkosi, M. Tavert, N.J. Coville, M. Adams and G.J. Hutchings, 'Gold-197 Mossbauer study of the deactivation and reactivation of a carbon-supported tetrachloroaurate hydrochlorination catalyst', *Hyperfine Interactions*, **69** (1991) 767-770.
97. S.E. Colley, R.G. Copperthwaite, G.J. Hutchings, G.A. Foulds and N.J. Coville, 'Cobalt/manganese oxide catalysts: use of chromium promoters for long chain hydrocarbon synthesis', *Appl. Catal.*, **84** (1991) 1-15.
98. J.S.J. Hargreaves, G.J. Hutchings, R.W. Joyner and C.J. Kiely, 'The relationship between catalyst morphology and performance in the oxidative coupling of methane', *J. Catal.*, **135** (1992) 576-595.
99. G.J. Hutchings, R.G. Copperthwaite, F.M. Gottschalk, R. Hunter, J. Mellor, S. W. Orchard and T. Sangiorgio, 'A comparative evaluation of cobalt chromium oxide, cobalt manganese oxide and copper manganese oxide as catalysts for the water-gas shift reaction', *J. Catal.*, **137** (1992) 408-422.
100. G.J. Hutchings, F. King, I.P. Okoye and C.H. Rochester, 'Influence of sulphur poisoning on copper/alumina catalyst on the selective hydrogenation of crotonaldehyde', *Appl. Catal. A*, **83** (1992) L7-L13.
101. G.J. Hutchings, R. Hunter, P. Johnston and L. Jansen van Rensburg, 'Methanol conversion to hydrocarbons over zeolite H-ZSM-5: Investigation of the role of CO and ketene in the formation of the initial C-C bond', *J. Catal.*, **142** (1993) 602-616.
102. M.B. Padley, C.H. Rochester, G.J. Hutchings, I.P. Okoye and F. King, 'FTIR and catalytic studies of the effects of sulphur poisons on Cu/Al<sub>2</sub>O<sub>3</sub> catalyst selectivity', *Proc. 10th Int. Cong. Catal., Budapest*, July 1992 ( Eds: L. Guzzi, F. Solymosi and P. Tetenyi ) Akademiai Kiado, Budapest, 1993, 2503-2506.
103. G.J. Hutchings, A. Desmartin Chomel, R. Olier and J.C. Volta, 'Role of the product in the transformation of a catalyst to its active site', *Nature*, **368** (1994) 41-45.
104. G.J. Hutchings, D.F. Lee and M. Lynch, 'Methanol conversion to hydrocarbons over zeolite H-ZSM-5: comments on the formation of C<sub>4</sub> hydrocarbons at low reaction temperatures', *Appl. Catal. A*, **106** (1993) 115-123.
105. G.J. Hutchings, P. Johnston, D.F. Lee and C.D. Williams, 'Acetone conversion to isobutene in high conversion using zeolite β catalyst', *Catal. Lett.*, **21** (1993) 49-53.
106. M.B. Padley, C.H. Rochester, G.J. Hutchings, P.I. Okoye and F. King, 'FTIR and catalytic studies of the effects of sulphur poisons on Cu/Al<sub>2</sub>O<sub>3</sub> catalyst selectivity', *Stud. Surf. Sci. Catal.*, **75** (1993) 2503-2506.

107. G.J. Hutchings, R. Olier, M.T. Sananés and J.C. Volta, 'Vanadium phosphate catalysts prepared by the reduction of VOPO<sub>4</sub>.2H<sub>2</sub>O', *Stud. Surf. Sci. Catal.*, **82** (1994) 213-220.
108. G.J. Hutchings, F. King, I.P. Okoye, M. Padley and C.H. Rochester, 'Selectivity enhancement by partial catalyst poisoning - a novel method of achieving increased yields', Prep. Int. Conf. Catalysis and Catalytic Processing (October 1993), *Cat. Soc., S. Africa*, 93-98.
109. G.J. Hutchings, R. Olier, M.T. Sananés and J.C. Volta, 'Importance of local structure of VPO catalysts from butane oxidation to maleic anhydride.' Prep. Int. Conf. Catalysis and Catalytic Processing (October 1993), *Cat. Soc., S. Africa*, 129-135.
110. A. Burrows, K.H. Blick, R.W. Devenish, G.J. Hutchings, R.W. Joyner, C.J. Kiely and M. Yu. Sinev, 'Structure function relationship in methane coupling: Nd<sub>2</sub>O<sub>3</sub>/MgO and MgO/Nd<sub>2</sub>O<sub>3</sub> catalysts', *Stud. Surf. Sci. Catal.*, **81** (1994)223-228.
111. G.J. Hutchings, F. King, I.P. Okoye, M.B. Padley and C.H. Rochester, 'Selectivity enhancement in the hydrogenation of  $\alpha,\beta$ -unsaturated aldehydes and ketones using thiophene-modified catalysts,' *J. Catal.*, **148** (1994) 453-463.
112. G.J. Hutchings, F. King, I.P. Okoye, M.B. Padley and C.H. Rochester, 'Modification of selectivity in the hydrogenation of crotonaldehyde using Cu/Al<sub>2</sub>O<sub>3</sub> catalysts modified with sulphur compound: effect of sulphur source', *J. Catal.*, **148** (1994) 464-469.
113. M.B. Padley, C.H. Rochester, G.J. Hutchings and F. King, 'FTIR spectroscopic study of thiophene and CO adsorption on Cu/Al<sub>2</sub>O<sub>3</sub> catalysts', *J. Catal.*, **148** (1994) 438-452.
114. G.J. Hutchings, F. King, I.P. Okoye and C.H. Rochester, 'Influence of chlorine poisoning of copper/alumina catalysts on the selective hydrogenation of crotonaldehyde, *Catal. Lett.*, **23** (1994) 127-133.
115. M.B. Padley, C.H. Rochester, G.J. Hutchings and F. King, 'FTIR spectroscopic study of the effects of sulphur poisons on CO adsorption on Cu/SiO<sub>2</sub> catalysts', *J. Chem. Soc. Faraday Trans.*, **90** (1994) 203-206.
116. G.J. Hutchings, P. Johnston, D.F. Lee A. Warwick, C.D. Williams and M. Wilkinson, 'Conversion of methanol and other O-compounds to hydrocarbons over zeolite  $\beta$ ', *J. Catal.*, **147** (1994)177-185.
117. G.J. Hutchings and D.F. Lee, Control of product selectivity for the epoxidation of allyl alcohol by variation of the acidity of the catalyst TS-1', *J. Chem. Soc., Chem. Commun.*, (1994) 1095-1096.
118. G.J. Hutchings, R.W. Joyner, M.R.H. Siddiqui and H. Rong, *Silicon Chem. Ind. [Int. Conf.]*, (1992) 85-98.
119. M.T. Sananes, A. Tuel, G.J. Hutchings and J.C. Volta, 'Characterisation of different precursors and activated vanadium phosphate catalyst by <sup>31</sup>P NMR spin echo mapping' *J. Catal.*, **148** (1994) 395-398.
120. S. Betteridge, C.R.A. Catlow, D.H. Gay, R.W. Grimes, J.S.J. Hargreaves, G.J. Hutchings, R.W. Joyner, Q.A. Pankhurst and S.H. Taylor, 'Preparation, characterisation and activity of an iron/sodalite catalyst for the oxidation of methane to methanol,' *Topics Catal.*, **1** (1994) 103-110.
121. N.W. Hayes, W. Grünert, G.J. Hutchings, R.W. Joyner and E.S. Shpiro, 'Formation, storage and reactivity of nitrile species during the lean NO<sub>x</sub> reaction over Cu/ZSM-5 catalysts', *J. Chem. Soc., Chem. Commun.*, (1994) 531-532.
122. J. Ellison, G.J. Hutchings, M.T. Sananes and J.C. Volta, 'Control of the composition and the morphology of vanadium phosphate catalyst precursors from alcohol treatment of VOPO<sub>4</sub>.2H<sub>2</sub>O', *J. Chem. Soc., Chem. Commun.*, (1994) 1093-1094
123. G.J. Hutchings, I.D. Hudson and D. Timms, 'Deactivation and reactivation of boron phosphate catalysts', *Stud. Surf. Sci. Catal.*, **88** (1994) 663-668.
124. P. Beahan, K.H. Brookes, G.J. Hutchings, R.W. Joyner, H.M. Rong and G.J. Tatlock, 'Surface characterisation of intermetallic inclusions in silicon', *Silicon Chem. Ind. [Int. Conf.]*, (1994) (ed. H.A. Oye *et al.*) Tapir Forlag Publishers, Trondheim, Norway, 93-105.
125. S. Feast, D. Bethell, G.J. Hutchings, P.C.B. Page, S.P. Saberi, F. King and C.H. Rochester, ' The effect of sulphoxide loadings on the selectivity and activity of zeolite Y for dehydration reactions: stability and structure of dithiane oxide in zeolite Y', *Stud. Surf. Sci. Catal.*, **84** (1994) 1611-1616.
126. R. Hughes, G.J. Hutchings, C.L. Koon, B. McGhee and C.E. Snape,'A fundamental study of the deactivation of FCC catalysts: a comparison of quinoline and phenanthrene as catalyst poisons',

- "Catalyst Deactivation" (ed. B. Delmon and G.F. Froment) *Proc. 6th Int. Symp. Catalyst Deactivation* (Oct 1994), Elsevier, 373-384.
127. G.J. Hutchings, R.G. Copperthwaite and M. van der Riet, 'Low methane selectivity using Co/MnO catalysts for the Fischer Trosch reaction', *Topics Catal.*, **2** (1995) 163-172.
  128. S. Betteridge, R.A. Catlow, R.W. Grimes, J.S.J. Hargreaves, G.J. Hutchings, R.W. Joyner, C.J. Kiely, D.F. Lee, Q.A. Pankhurst, S.H. Taylor and D. Whittle, "A study of the iron/sodalite catalyst for the partial oxidation of methane to methanol", *Proc. Am. Chem. Soc. Symp.*, **1** (1995) 187-193.
  129. S.H. Taylor, J.S.J. Hargreaves, G.J. Hutchings and R.W. Joyner, 'An initial strategy for the design of improved catalysts for methane oxidation', *Appl. Catal. A*, **126** (1995) 287-296.
  130. M.T. Sananes, A. Tuel, G.J. Hutchings and J.C. Volta, 'Use of  $^{31}\text{P}$  NMR by spin echo mapping to prepare precursors of vanadium phosphate catalysts for n-butane oxidation to maleic anhydride', *Stud. Surf. Sci. Catal.*, **91** (1995) 27-32.
  131. G.J. Buckles and G.J. Hutchings, 'Evidence for the reversible formation of a catalytic active site for propane aromatization for  $\text{Ga}_2\text{O}_3/\text{H-ZSM-5}$ ', *Catal. Lett.*, **27** (1994) 361-67.
  132. G.J. Hutchings and G.J. Buckles, 'Conversion of propane using H-ZSM-5 and Ga/H-ZSM-5 in the presence of co-fed nitric oxide, oxygen and hydrogen', *J. Catal.*, **151** (1995) 33-43.
  133. G. J. Hutchings, I. D. Hudson and D. G. Timms, 'Reactivation of Boron Phosphate Catalysts for the Synthesis of Isoprene from 2-methyl butanal dehydration', *J. Chem. Soc., Chem. Commun.*, (1994) 2717-2718.
  134. M.T. Sananes, G.J. Hutchings and J.C. Volta, '*n*-Butane oxidation to maleic anhydride and furan with no carbon oxide formation using a catalyst derived from  $\text{VO}(\text{H}_2\text{PO}_4)_2$ ', *J. Chem. Soc., Chem. Commun.*, (1995) 243-244.
  135. G.J. Hutchings, I.T. Cairns and S.P. Saberi, 'Comments on the use of buckminsterfullerene encapsulated in zeolite Y as a potential catalyst', *Catal. Lett.*, **30** (1995) 131-134.
  136. M.B. Padley, C.H. Rochester, G.J. Hutchings and F. King, 'FTIR study of the effects of sulphur poisons on NO adsorption on supported copper catalysts', *J. Chem. Soc., Faraday Trans.*, **91** (1995) 141-144.
  137. G.J. Hutchings and D.F. Lee, 'Selectivity control in the reaction of allyl alcohol over zeolite Y', *J. Chem. Soc., Chem. Commun.*, (1994) 2503-2504.
  138. R. Hughes, G.J. Hutchings, C.L. Koon, B.H. McGhee and C.E. Snape, 'A comparison of the propensity of quinoline and phenanthrene to deactivate FCC catalysts', *Prp. Div. Pet. Chem., 208th National ACS Symp.*, (1994) 379-383.
  139. R. Hughes, G.J. Hutchings, C.L. Koon, B.H. McGhee, C.E. Snape and D. Yu, 'Deactivation of FCC catalysts using n-hexadecane feed with various additives' *Appl. Catal. A*, **144** (1996) 269-279.
  140. C.E. Snape, B.H. McGhee, J.M. Andresen, R. Hughes, C.L. Koon and G.J. Hutchings, 'Characterisation of coke from FCC refinery catalysts by quantitative solid state  $^{13}\text{C}$  nmr', *Appl. Catal. A*, **129** (1995) 125-132.
  141. G.J. Hutchings, D.F. Lee and A.R. Minihan, 'Epoxidation of allyl alcohol to glycidol using titanium silicalite TS-1: effect of the method of preparation', *Catal. Lett.*, **33** (1995) 369-385.
  142. G.J. Hutchings, D.F. Lee and A.R. Minihan, 'Epoxidation of allyl alcohol to glycidol using titanium silicalite TS-1: effect of the reaction conditions and catalyst acidity', *Catal. Lett.*, **39** (1996) 83-90.
  143. G.J. Hutchings and D.F. Lee, 'Selective conversion of allyl alcohol to oxygenates and hydrocarbons using ion exchanged zeolite Y', *Catal. Lett.*, **34** (1995) 115-127
  144. C.J. Kiely, S. Sajip, I.D. Ellison, M.T. Sananes, G.J. Hutchings and J.C. Volta, 'Electron microscopy studies of vanadium phosphorus catalysts derived from  $\text{VOPO}_4 \cdot 2\text{H}_2\text{O}$ ', *Catal. Lett.*, **33** (1995) 357-368.
  145. G.J. Hutchings and R. Higgins, 'Effect of promoters on the selective oxidation of n-butane with vanadium-phosphorus oxide catalysts', *J. Catal.*, **162** (1996) 153-168.
  146. G.J. Buckles and G.J. Hutchings, 'Comments on "Evidence for the reversible formation of a catalytic active site for propane aromatization for  $\text{Ga}_2\text{O}_3/\text{H-ZSM-5}$ , A response', *Catal. Lett.*, **32** (1995) 237-239.
  147. M.W. Anderson, J. Dwyer, G.J. Hutchings, D.F. Lee, M. Makarova and B. Zibrowius, 'A combined MAS nuclear magnetic resonance spectroscopy, *in situ* FT infrared spectroscopy and catalytic study of the conversion of allyl alcohol over zeolite catalysts', *Catal. Lett.*, **31** (1995) 377-393.

148. S. Feast, D. Bethell, P.C.B. Page, F. King, C.H. Rochester, M.R.H. Siddiqui, D.J. Willock and G.J. Hutchings, 'Gas phase catalytic asymmetric reaction using chirally modified microporous catalysts', *J. Chem. Soc., Chem. Comm.* (1995) 2409-2411.
149. Burrows, S. Sajip, C.J. Kiely, G.J. Hutchings, M. Abon and J.C. Volta, 'Electron-microscopy studies of transformations in the vanadium phosphate catalyst system', *Inst. Phys. Conf. Ser.*, **147** (1995) 333-336.
150. M.T. Sananes, G.J. Hutchings and J.C. Volta, 'On the role of the VO(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub> precursor for n-butane oxidation into maleic anhydride', *J. Catal.*, **154** (1995) 253-260.
151. M.T. Sananes, I.J. Ellison, S. Sajip, A. Burrow, C.J. Kiely, J.C. Volta and G.J. Hutchings, 'n-butane oxidation using catalysts prepared by treatment of VOPO<sub>4</sub>.2H<sub>2</sub>O with octanol', *J. Chem. Soc., Faraday Trans.*, **92** (1996) 137-142.
152. A. Burrows, C.J. Kiely, R.W. Devenish, G.J. Hutchings, R.W. Joyner and M.Y. Sinev, 'Structure/reactivity studies of MgO/Nd<sub>2</sub>O<sub>3</sub> doped MgO/Nd<sub>2</sub>O<sub>3</sub> catalysts used in methane coupling', *Proc. Mat. Res. Soc. Symp.*, **344** (1994) 39-44.
153. Q.A. Pankhurst, S. Betteridge, J.S.J. Hargreaves, R.W. Joyner, G.J. Hutchings and S.H. Taylor, 'Iron sodalite catalysts for the oxidation of methane to methanol', *Proc., ICAME 95*, (1996) 673-676.
154. J.S.J. Hargreaves, G.J. Hutchings, R.W. Joyner, and S.H. Taylor, 'Methane partial oxidation to methanol over Ga<sub>2</sub>O<sub>3</sub> based catalysts: use of the CH<sub>4</sub>/D<sub>2</sub> exchange reaction as a design tool', *Chem. Comm.*, (1996) 523-524.
155. M.T. Sananes-Schulz, F. Ben Abdelouahab, G.J. Hutchings and J.C. Volta, 'On the role of Fe and Co dopants during the activation of VO(HPO<sub>4</sub>), 0.5H<sub>2</sub>O precursor of the vanadium phosphorus catalyst as studied by *in situ* laser Raman spectroscopy II. Study of VO(HPO<sub>4</sub>), 0.5H<sub>2</sub>O precursors prepared by reduction of VOPO<sub>4</sub>.2H<sub>2</sub>O by isobutanol', *J. Catal.*, **163** (1996) 2, 346-353.
156. K.H. Brookes, G.J. Hutchings, R.W. Joyner, H.M. Rong and G.J. Tatlock, 'Can the Surface composition of intermetallic phases in silicon explain their behaviour in the direct process for the production of methylchlorosilanes?' Proceedings from Silicon for the Chemical Industry III, Sandefjord 18-20 June, 1996, 215-226 (ed. H.A. Oye *et al.*) Tapir Forlag Publishers, Trondheim.
157. G.J. Hutchings, I.J. Ellison, M.T. Sananes and J.C. Volta, 'n-Butane oxidation to maleic anhydride: effect of Co and Fe addition by the method of incipient wetness on vanadium phosphate catalysts prepared by the aqueous HCl method', *Catal. Lett.*, **38** (1996) 231-237.
158. G.J. Buckles and G.J. Hutchings, 'Aromatization of propane over Ga/H-ZSM-5: comments on the activation of propane', *Catal. Today*, **31** (1996) 233-246.
159. S. Feast, D. Bethell, P.C.B. Page, F. King, C.H. Rochester, M.R.H. Siddiqui, D.J. Willock and G.J. Hutchings, 'Enantioselection using modified zeolite catalysts', *J. Mol. Catal. A*, **107** (1996) 291-295.
160. C.J. Kiely, A. Burrows, S. Sajip, G.J. Hutchings, M.T. Sananes, A. Tuel and J.C. Volta, 'Characterisation of variations in vanadium phosphate catalyst microstructure with preparation route', *J. Catal.*, **162** (1996) 31-47.
161. B.J. McGhee, J.M. Andresen, C.E. Snape, R. Hughes, C.L. Koon and G.J. Hutchings, 'Characterisation of fluid catalytic cracking catalyst coke by C-13 NMR and mass spectroscopy', *ACS Symp. Ser.*, **634** (1996) 117-132.
162. S. Feast, D. Bethell, P.C. Page, M.R.H. Siddiqui, D.J. Willock, G.J. Hutchings, F. King and C.H. Rochester, 'Heterogeneous enantioselective dehydration of butan-2-ol', *Stud. Surf. Sci. Catal.*, **101** (1996) 211-219.
163. D.W. Lewis, D.J. Willock, C.R.A. Catlow, J.M. Thomas and G.J. Hutchings, 'De-novo design of structure-directing agents for the synthesis of microporous solids', *Nature*, **382** (1996) 604-606.
164. D.J. Willock, D. Bethell, Saskia Feast, G.J. Hutchings, F. King and P.C.B. Page, 'Creating chiral centres in zeolite Y by the introduction of R-1,3-dithiane 1-oxide as a modifier: computer simulation of the modifier stability', *Topics Catal.*, **3** (1996) 77-89.
165. D.M. Whittle, A.A. Mirzaei, C.J. Kiely and G.J. Hutchings, "The structural evolution of Cu/ZnO methanol synthesis catalyst precursors with ageing time", *Proc. EUREM Conf.*, Paper M2-13 (1996).
166. G.J. Hutchings, S.H. Taylor and I.D. Hudson, 'A new class of uranium oxide based catalysts for the oxidative destruction of benzene and butane volatile organic compounds', *Prepr. ACS, Symposium on Heterogeneous Hydrocarbon Oxidation, Div. Petr. Chem.*, **41** (1996) 106-109.

167. C.J. Kiely, A. Burrows, G.J. Hutchings, K. E. Bere, J.C. Volta, A. Tuel and M. Abon, 'Structural transformation sequences occurring during the activation of vanadium phosphorus oxide catalysts', *J. Chem. Soc., Faraday Disc.*, **105** (1996) 103-118.
168. G.J. Hutchings, A. Mirzaei, R. Joyner, M.R.H. Siddiqui and S.H. Taylor, 'Ambient temperature CO oxidation using copper manganese oxide catalysts prepared by coprecipitation : effect of ageing on catalyst performance', *Catal. Lett.*, **42** (1996) 21-24.
169. G.J. Hutchings, C.S. Heneghan, I.D. Hudson and S.H. Taylor, 'Uranium-oxide-based catalysts for the destruction of chloro-organic compounds', *Nature*, **384** (1996) 341-343.
170. G.J. Hutchings, C.S. Heneghan, I.D. Hudson and S.H. Taylor, 'A new class of uranium oxide based catalysts for the oxidative destruction of benzene and butane volatile organic compounds', Heterogeneous hydrocarbon oxidation, *ACS Ser. Chem*, **638** (ed. B.K. Warren and S.T. Oyama) (1996) 58-75.
171. G.J. Hutchings and R. Higgins, 'Selective oxidation of n-butane to maleic anhydride with vanadium phosphorus catalysts prepared by comminution in the presence of dispersants', *Appl. Catal. A*, **154** (1997) 103-115.
172. G.J. Hutchings, M.T. Sananes, S. Sajip, C.L. Kiely, A Burrows, I.J. Ellison and J.C. Volta, 'Improved method of preparation of vanadium phosphate catalysts', *Catal. Today*, **33** (1997) 161-171.
173. A. Burrows, C.J. Kiely, G.J. Hutchings, R.W. Joyner and M.Y. Sinev, 'Structure/ function relationships in Nd<sub>2</sub>O<sub>3</sub> doped MgO catalysts for the methane coupling reaction', *J. Catal.*, **167** (1997) 77-91.
174. J.E. Bailie, C.H. Rochester and G.J. Hutchings, 'Effects of thiothene and sulfur dioxide on CO adsorption on cobalt/silica catalysts', *J. Chem. Soc., Faraday Trans.*, **93** (1997) 2331-2336.
175. C.J. Kiely, A. Burrows, S. Sajip, C. Rhodes, J. Bartley, G.J. Hutchings and J.C. Volta, 'Comment on unit cell information for  $\delta$ - and  $\gamma$ -VOPO<sub>4</sub>', *J. Catal.*, **171** (1997) 509-511.
176. F. Cavani, A. Colombo, F. Trifiro, M.T. Sananes Schulz, J.C. Volta and G.J. Hutchings, 'The effect of cobalt and iron dopants on the catalytic behaviour of VPO catalysts for the selective oxidation of pentane to maleic and phthalic anhydrides', *Catal. Lett.*, **43** (1997) 241-247.
177. M.T. Sananes-Schulz, A. Tuel, G.J. Hutchings and J.C. Volta, 'The V<sup>4+</sup>/V<sup>5+</sup> balance as a criterion of selection of vanadium phosphorus oxide catalysts for n-butane oxidation to maleic anhydride : A proposal to explain the role of Co and Fe dopants', *J. Catal.*, **166** (1997) 388-392.
178. G.J. Hutchings, M.R.H. Siddiqui, A. Burrows, C.J. Kiely and R. Whyman, 'High activity Au/CuO-ZnO catalysts for the oxidation of carbon monoxide at ambient temperature', *J. Chem. Soc., Faraday Trans.*, **93** (1997) 187-188
179. S. Feast, M. R. H. Siddiqui, R. Wells, D. J. Willock, F. King, C. H. Rochester, D. Bethell, P. C. B. Page and G. J. Hutchings, 'Enantioselective Dehydration of Butan-2-ol using Zeolite Y Modified with Dithiane Oxides', *J. Catal.*, **167** (1997) 533-542.
180. D.J. Willock, D.W. Lewis, C.R.A. Catlow, G.J. Hutchings and J.M. Thomas, 'Designing templates for the synthesis of microporous solids using *de novo* molecular design methods', *J. Mol. Catal. A*, **119** (1997) 415-424.
181. G. J. Hutchings, R. Wells, S. Feast, M. R. H. Siddiqui, D. J. Willock, F. King, C. H. Rochester, D. Bethell and P. C. B. Page, 'Enantioselective Dehydration of Butan-2-ol using Zeolite Y Modified with Dithiane Oxides: Comments on the nature of the active site', *Catal. Lett.*, **46** (1997) 249-254.
182. G.J. Hutchings, J.S.J. Hargreaves, R.W. Joyner and S.H. Taylor, 'A novel approach for the scientific design of oxide catalysts for the partial oxidation of methane to methanol', *Stud. Surf. Sci. Catal.*, **107** (1997) 41-46.
183. S.S. Ashour, J.E. Bailie, C.H. Rochester, J. Thomson and G.J. Hutchings, 'FTIR study of CO adsorption on Pd/SiO<sub>2</sub> and Pd-Cu/SiO<sub>2</sub> treated with sulphur dioxide', *Catal. Lett.*, **46** (1997) 181-185
184. S.S. Ashour, J.E. Bailie, C.H. Rochester, J. Thomson and G.J. Hutchings, 'Effects of thiophene on CO adsorption and crotonaldehyde hydrogenation over silica supported Pd-Cu catalysts', *J. Mol. Cat. A*, **123** (1997) 65-74.
185. J.E. Bailie, C.H. Rochester and G.J. Hutchings, 'IR study of acrolein hydrogenation over Co/SiO<sub>2</sub> catalysts', *J. Chem. Soc., Faraday Trans.*, **93** (1997) 4389-4394.
186. G. J. Hutchings, A. Burrows, C. Rhodes, C. J. Kiely and R. McClung, 'Dealumination of Mordenite Catalysts using a Low Concentration of Steam', *J. Chem. Soc., Faraday Trans.*, **93** (1997) 3593-3598.

187. G. J. Hutchings, A. Burrows, S. Sajip, C. J. Kiely, K. E Bere, J.C. Volta, A. Tuel and M. Abon, 'Understanding the Microstructural Transformation Mechanism which takes place during the Activation of Vanadium Phosphorus Oxide Catalysts', *Stud. Surf. Sci. Catal.*, **110** (1997) 209-218.
188. G. J. Hutchings, P. G. Firth, D. F. Lee, P. McMorn, D. Bethell, P. C. B. Page, F King and F. Hancock, 'Shape Selective Epoxidation of Crotyl Alcohol with H<sub>2</sub>O<sub>2</sub> in the Presence of TS-1', *Stud. Surf. Sci. Catal.*, **110** (1997) 535-544.
189. G.J. Hutchings, A.A. Mirzaei, R.W. Joyner, M.R.H. Siddiqui and S.H. Taylor, 'Effect of preparation conditions on the catalytic performance of copper manganese oxide catalysts for CO oxidation', *Appl. Catal. A*, **166** (1998) 143-152.
190. K. Blick, T. D. Mitrelias, J.S.J. Hargreaves, G.J. Hutchings, R.W. Joyner, C.J. Kiely and F.E. Wagner, 'Methane oxidation using Au/MgO Catalysts', *Catal. Lett.*, **50** (1998) 211-218.
191. A. Burrows, C.J. Kiely, J.S.J. Hargreaves, R.W. Joyner, G.J. Hutchings, M.Y. Sinev and Y.P. Tulenin, 'Structure/ function relationships in MgO-doped Nd<sub>2</sub>O<sub>3</sub> catalysts for the methane coupling reaction', *J. Catal.*, **173** (1998) 383-398.
192. G.J. Hutchings, C.J. Kiely, M.T. Sananes-Schulz, A. Burrows and J.C. Volta, 'Comments on the Nature of the Active Site of Vanadium Phosphate Catalysts for Butane Oxidation', *Catal. Today*, **40** (1998) 273-286.
193. S. Sajip, G. MacPherson, C.J. Kiely, G.J. Hutchings, M. Abon and J.C. Volta, 'The Structural Transformation of (VO)<sub>2</sub>P<sub>2</sub>O<sub>7</sub> to VPO<sub>4</sub>', Proc. ICEM14, 1998, *Electron Microscopy*, **II** (1998) 461-462.
194. I.D. Hudson, C.S. Heneghan, G.J. Hutchings and S.H. Taylor, 'A new class of uranium oxide based catalysts for the oxidative destruction of volatile organic compounds in the vapour phase', *Proc. 90th Ann. Meeting Air Waste Management Assoc.*, RA13302 (1997) 1-12.
195. G.J. Hutchings, C.S. Heneghan, S.H. Taylor and I.D. Hudson, 'The catalytic combustion of volatile chloro-organic compounds using uranium oxide catalysts', *Prepr. ACS, Symposium on Catalytic Combustion, Div. Petr. Chem.*, **42(1)** (1997) 142-145.
196. A. Thursfield, M.W. Anderson, J. Dwyer, G.J. Hutchings and D.F. Lee, '<sup>13</sup>C and <sup>15</sup>N solid state MAS NMR study of the conversion of methanol and ammonia over H-RHO and H-SAPO-34 microporous catalysts', *J. Chem. Soc., Faraday Trans.*, **94** (1998) 1119-1122.
197. G.J. Hutchings and D.J. Willock, 'Heterogeneous enantioselective catalysts : can molecular simulation techniques aid the design of improved catalysts?', *Topics Catal.*, **5** (1998) 177-185.
198. S.H. Taylor, J.S.J. Hargreaves, G.J. Hutchings, R.W. Joyner and C.W. Lembacher, 'The partial oxidation of methane to methanol : An approach to catalyst design', *Catal. Today*, **42** (1998) 217-224.
199. C. Langham, P. Piaggio, D. Bethell, D.F. Lee, P. McMorn, P.C.B. Page, D.J. Willock, C. Sly, F.E. Hancock, F. King and G.J. Hutchings, 'Catalytic heterogeneous aziridination of alkenes using microporous materials', *Chem. Commun.*, **15** (1998) 1601-1602.
200. E.G. Derouane, G.J. Hutchings, W.F. Mbafor and S.M. Roberts, 'Titanium-substituted zeolite beta : an efficient catalyst in the oxy-functionalisation of cyclic alkenes using hydrogen peroxide in organic solvents', *New J. Chem.*, **22** (1998) 797-799.
201. J.E. Bailie, C.H. Rochester and G.J. Hutchings, 'Effects of thiophene and SO<sub>2</sub> on acrolein hydrogenation over Co/SiO<sub>2</sub> catalysts', *J. Mol. Catal. A*, **136** (1998) 35-46.
202. J. West, B.P. Williams, N.C. Young, C. Rhodes and G.J. Hutchings, 'New directions for COS hydrolysis : Low temperature alumina catalysts', *Stud. Surf. Sci. Catal.*, **119** (1998) 373-378.
203. B.W.L. Southward, L.S. Fuller, G.J. Hutchings, R.W. Joyner and R.A. Stewart, 'Novel catalysts for thiophene synthesis at lower temperatures', *Chem. Commun.*, (1998) 2541-2542.
204. P. Piaggio, P. McMorn, C. Langham, D. Bethell, P.C.B. Page, F.E. Hancock and G.J. Hutchings, 'Asymmetric epoxidation of stilbene by manganese(III) chiral salen complex immobilized in Al-MCM-41', *New J. Chem.*, **22** (1998) 1167-1169.
205. B.W.L. Southward, L.S. Fuller, G.J. Hutchings, R.W. Joyner and R.A. Stewart, 'Comments on the mechanism of the vapour-phase catalytic synthesis of thiophenes', *Catal. Lett.*, **55** (1998) 207-210.
206. M.A. Banares, J.H. Cardoso, G.J. Hutchings, J.M. Correa Bueno and J.L.G. Fierro, 'Selective oxidation of methane to methanol and formaldehyde over V<sub>2</sub>O<sub>5</sub>/SiO<sub>2</sub> catalysts. Role of NO in the gas phase', *Catal. Lett.*, **56** (1998) 149-153.

207. S. Sajip, C. Rhodes, J.K. Bartley, A. Burrows, C.J. Kiely and G.J. Hutchings, "The effect of cobalt doping on the structural transformation sequences occurring during the activation of vanadium phosphorus oxide catalysts", *Proc. NATO Advanced Study Institute on 'Catalytic activation and functionalisation of light alkanes'* (ed. E.G. Derouane *et al.*) (1998) 429-433.
208. C. Langham, P. Piaggio, D. Bethell, D.F. Lee, P. McMorn, P.C.B. Page, D.J. Willock, C. Sly, F.E. Hancock, F. King and G.J. Hutchings, "Catalytic aziridination of alkenes", *Cat. Org. Reactions*, **3** (1998) 25-26.
209. C. Langham, S. Taylor, D. Bethell, P. McMorn, P.C.B. Page, D.J. Willock, C. Sly, F.E. Hancock, F. King and G.J. Hutchings, 'Catalytic asymmetric heterogeneous aziridination of alkenes using zeolite CuHY with [N-(p-tolylsulfonyl)imino]phenyliodinane as nitrene donor,' *J. Chem. Soc., Perkin Trans. 2*, (1999) 1043-1049.
210. R.M. Finch, N.A. Hodge, G.J. Hutchings, A. Meagher, Q.A. Pankhurst, M.R.H. Siddiqui, F.E. Wagner and R. Whyman, 'Identification of active phases in Au-Fe catalysts for low-temperature CO oxidation', *Phys. Chem. Chem. Phys.*, **1** (1999) 485-489.
211. B.P. Williams, N.C. Young, J. West, C. Rhodes and G.J. Hutchings, 'Carbonyl sulphide hydrolysis using alumina catalysts', *Catal. Today*, **49** (1999) 99-104.
212. G.J. Hutchings, S.H. Taylor and I.D. Hudson, 'Designing heterogeneous oxidation catalysts', *Science and Technology in Catalysis 1998, Stud. Surf. Sci. Catal.*, **121** (1999) 85-92.
213. R.P.K. Wells, P. Tynjala, J.E. Bailie, M.R.H. Siddiqui, D.J. Willock, G.W. Watson, F. King, C.H. Rochester, D. Bethell, P.C.B. Page and G.J. Hutchings, 'Dehydration of butan-2-ol using modified zeolite catalysts', *Appl. Catal. A*, **182** (1999) 75-84.
214. C. Langham, D. Bethell, D.F. Lee, P. McMorn, P.C.B. Page, D.J. Willock, C. Sly, F.E. Hancock, F. King and G.J. Hutchings, 'Heterogeneous aziridination of alkenes using Cu<sup>2+</sup>-exchanged zeolites', *Appl. Catal. A*, **182** (1999) 85-89.
215. P. Johnston, G.J. Hutchings, N.J. Coville, K.P. Finch and J.R. Moss, "CO hydrogenation using supported iron carbonyl complexes", *Appl. Catal. A*, **186** (1999) 245-253.
216. G.J. Hutchings, I.D. Hudson and D.G. Timms, 'Dehydration of 2-methylbutanal to isoprene using aluminium phosphate catalysts', *Catal. Lett.*, **61** (1999) 219-224.
217. S.H. Taylor, G.J. Hutchings and A.A. Mirzaei, "Copper zinc oxide catalysts for ambient temperature carbon monoxide oxidation", *Chem. Commun.*, (1999) 1373-1374.
218. J.E. Bailie and G.J. Hutchings, "Promotion by sulfur of gold catalysts for crotyl alcohol formation from crotonaldehyde hydrogenation", *Chem. Commun.*, (1999), 2151-2152.
219. P. McMorn, G. Roberts and G.J. Hutchings "Oxidation of Glycerol with Hydrogen Peroxide using Silicalite and Aluminophosphate Catalysts", *Catal. Lett.*, **63** (1999) 193-197.
220. G.J. Hutchings, I.D. Hudson, D. Bethell and D.G. Timms, 'Novel synthesis of isoprene from 3-methylbutan-2-one using phosphate catalysts', *Chem. Commun.*, (1999) 1489-1490.
221. C.S. Heneghan, G.J. Hutchings, S.R. O'Leary, S.H. Taylor, V.J. Boyd and I.D. Hudson, "A Temporal Analysis of Products Study of the Mechanism of VOC Catalytic Oxidation using Uranium Oxide Catalysts", *Catal. Today*, **54** (1999) 3-12.
222. G.J. Hutchings, I.D. Hudson, D. Bethell and D.G. Timms, 'Dehydration of 2-methylbutanal and methyl isopropyl ketone to isoprene using boron and aluminium phosphate catalysts', *J. Catal.*, **188** (1999) 291-299.
223. B.W.L. Southward, L.S. Fuller, G.J. Hutchings, R.W. Joyner and R.A. Stewart, 'Novel alkaline earth supported catalysts for thiophene synthesis', *Chem. Commun.*, (1999) 369-370.
224. G.J. Hutchings, G.W. Watson and D.J. Willock, 'Methanol conversion to hydrocarbons over zeolite catalysts: Comments on the reaction mechanism for the formation of the first carbon-carbon bond', *Microporous Mesoporous Mat.*, **29** (1999) 67-77.
225. G.J. Hutchings and S.H. Taylor, 'Designing oxidation catalysts', *Catal. Today*, **49** (1999) 105-113.
226. K.H. Brookes, M.R.H. Siddiqui, H.M. Rong, R.W. Joyner and G.J. Hutchings, 'Effect of Al and Ca additions on the copper catalysed formation of silanes from Si and CH<sub>3</sub>Cl', *Appl. Catal. A*, (2000).
227. P. Piaggio, C. Langham, P. McMorn, D. Bethell, P.C. Bulman-Page, F.E. Hancock, C. Sly and G.J. Hutchings, 'Catalytic asymmetric epoxidation of stilbene using a chiral salen complex immobilized in Mn-exchanged Al-MCM-41', *J. Chem. Soc. Perkin Trans. 2*, (2000) 143-148.

228. J.E. Bailie, G.J. Hutchings, H.A. Abdullah, J.A. Anderson and C.H. Rochester, 'Effects of C5-Heterocyclic Compounds on CO Adsorption and Crotonaldehyde Hydrogenation over Supported Cu and Co Catalysts', *Phys. Chem. Chem. Phys.*, **2** (2000) 283-290.
229. D.J. Robinson, L. Davies, N. McGuire, D.F. Lee, P. McMorn, D.J. Willock, G.W. Watson, P.C.B. Page, D. Bethell and G.J. Hutchings, 'Oxidation of thioethers and sulfoxides with hydrogen peroxide using TS-1 as catalyst', *Phys. Chem. Chem. Phys.*, **2** (2000) 1523-1529.
230. G. W. Watson, R.P.K. Wells, D.J. Willock and G.J. Hutchings, 'Ab initio simulation of the interaction of hydrogen with the {111} surfaces of platinum, palladium and nickel. A possible explanation for their difference in hydrogenation activity', *Chem. Commun.*, (2000) 705-706.
231. P.J. Collier, M. Johns and G.J. Hutchings, 'Comparative study of Fischer Tropsch synthesis with carbon monoxide/hydrogen and carbon monoxide/hydrogen/nitrogen mixtures', *Prep. Div. Petr. Chem.*, ACS, **45** (2000) 199-201.
232. T.J. Hall, J.E. Halder, G.J. Hutchings, R.J. Jenkins, P. Johnston, P. McMorn, P.B. Wells and R.P.K. Wells, 'Enantioselective hydrogenation of pyruvate esters in the mesoporous environment of Pt-MCM-41', *Topics Catal.*, **11/12** (2000) 351-357.
233. G.W. Watson, R.P.K. Wells, D.J. Willock and G.J. Hutchings, ' $\pi$  adsorption of ethene on to the {111} surface of copper. A periodic ab initio study of the effect of  $\kappa$ -point sampling on the energy, atomic and electronic structure', *Surf. Sci.*, **459** (2000) 93-103.
234. S.H. Taylor, C.S. Heneghan, G.J. Hutchings and I.D. Hudson, 'The activity and mechanism of uranium oxide catalysts for the oxidative destruction of volatile organic compounds', *Catal. Today*, **59** (2000) 249-259.
235. L. Davies, P. McMorn, D. Bethell, P.C. Bulman Page, F. King, F.E. Hancock and G.J. Hutchings, 'By-product formation causes leaching of Ti from the redox molecular sieve TS-1', *Chem. Commun.*, (2000) 1807-1808.
236. P. McMorn, G. Roberts and G.J. Hutchings, 'Oxidation of  $\alpha$ -pinene to verbonone using silica-titania co-gel catalyst', *Catal. Lett.*, **67** (2000) 203-206.
237. P. Piaggio, P. McMorn, D. Murphy, D. Bethell, P.C. Bulman Page, F.E. Hancock, C. Sly, O.J. Kerton and G.J. Hutchings, 'Enantioselective epoxidation of (Z)-stilbene using a chiral Mn(III)-salen complex : effect of immobilisation on MCM-41 on product selectivity', *J. Chem. Soc., Perkin Trans. 2*, (2000) 2008-2015.
238. H.A. Abdullah, C.H. Rochester, J.A. Anderson, J.E. Bailie, N.V. Richardson and G.J. Hutchings, 'Effects of carboxylic acid adsorbates on CO adsorption and crotonaldehyde hydrogenation over Cu/Al<sub>2</sub>O<sub>3</sub> catalyst', *Phys. Chem. Chem. Phys.*, **2** (2000) 3925-3932.
239. G.J. Hutchings, C. Langham, P. Piaggio, S. Taylor, P. McMorn, D.J. Willock, D. Bethell, P.C. Bulman Page, C. Sly, F.E. Hancock and F. King, 'Catalytic asymmetric heterogeneous aziridination and epoxidation of alkenes using modified microporous and mesoporous materials', *Stud. Surf. Sci. Catal.*, **130** (2000) 521-526.
240. S. Holmes, L. Sartoni, A. Burrows, V. Martin, G.J. Hutchings, C.J. Kiely and J.C. Volta, 'Modifications of vanadium phosphorus oxides by aluminium phosphate for n-butane oxidation to maleic anhydride', *Stud. Surf. Sci. Catal.*, **130** (2000) 1709-1714.
241. P.C. Bulman Page, G.J. Hutchings and D. Bethell, 'Enantioselective heterogeneous catalysis using modified zeolite catalysts', CPhI Proceedings, Milan, November 2000.
242. M. Bankhead, G.W. Watson, G. J. Hutchings, J. Scott, and D. J. Willock, 'Calculation of the energy profile for the fluorination of dichloromethane over an  $\alpha$ -alumina catalyst.', *Appl. Catal. A*, **200** (2000) 263-274.
243. G.W. Watson, R.P.K. Wells, D.J. Willock and G.J. Hutchings, 'Density functional theory calculations on the interaction of ethene with the {111} surface of platinum', *J. Phys. Chem. B*, **104** (2000) 6439-6446.
244. J.K. Bartley, C. Rhodes, C.J. Kiely, A.F. Carley and G.J. Hutchings, 'n-Butane oxidation using VO(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub> as catalyst derived from an aldehyde/ketone based preparation method', *Phys. Chem. Chem. Phys.*, **2** (2000) 4999-5006.
245. L.J. Davies, P. McMorn, D. Bethell, P.C.B. Page, F. King, F.E. Hancock and G.J. Hutchings, 'Oxidation of crotyl alcohol using Ti- $\beta$  and Ti-MCM-41 catalysts', *J. Mol. Cat. A*, **165** (2000) 243-247.

246. R. Shafi, M.R.H. Siddiqui, G.J. Hutchings, E.G. Derouane and I.V. Kozhevnikov, 'Heteropoly acid precursor to a catalyst for dibenzothiophene desulfurization', *Appl. Catal. A*, **204** (2000) 251-256.
247. J.K. Bartley, R.P.K. Wells and G.J. Hutchings, 'The unexpected role of aldehydes and ketones in the standard preparation method for vanadium phosphate catalysts', *J. Catal.*, **195** (2000) 423-427.
248. Sujata Sajip, Jonathan K. Bartley, Andrew Burrows, Maria-Teresa Sananes-Schulz, Alain Tuel, Jean Claude Volta, Christopher J. Kiely and Graham J. Hutchings, 'Structure-activity relationships for Co- and Fe-promoted vanadium phosphorus oxide catalysts', *New J. Chem.*, **25** (2001) 125-130.
249. L. Davies, P. McMorn, D. Bethell, P.C.B. Page, F. King, F.E. Hancock and G.J. Hutchings, 'Effect of preparation method on leaching of Ti from the redox molecular sieve TS-1', *Phys. Chem. Chem. Phys.*, **3** (2001) 632-639.
250. G.J. Hutchings, J.K. Bartley, J.M. Webster, J.A. Lopez-Sanchez, D.J. Gilbert, C.J. Kiely, A.F. Carley, S.M. Howdle, S. Sajip, S. Caldarelli, C. Rhodes, J.C. Volta and M. Poliakoff, 'Amorphous vanadium phosphate catalysts from supercritical antisolvent precipitation', *J. Catal.*, **197** (2001) 232-235.
251. Y. Traa, D.M. Murphy, R.D. Farley and G.J. Hutchings, 'An EPR study on the enantioselective aziridination properties of a CuNaY zeolite', *Phys. Chem. Chem. Phys.*, **3** (2001) 1073-1080.
252. J.K. Bartley, C.J. Kiely, R.P.K. Wells and G.J. Hutchings, 'Vanadium(V) phosphate prepared using solvent-free method', *Catal. Lett.*, **72** (2001) 99-105.
253. D.J. Robinson, P. McMorn, D. Bethell, P.C.B. Page, C. Sly, F. King, F.E. Hancock and G.J. Hutchings, 'N-oxidation of pyridines by hydrogen peroxide in the presence of TS-1', *Catal. Lett.*, **72** (2001) 233-234.
254. L.J. Davies, P. McMorn, D. Bethell, P.C.B. Page, F. King, F.E. Hancock and G.J. Hutchings, 'Epoxidation of crotyl alcohol using Ti-containing heterogeneous catalysts : Comments on the loss of Ti by leaching', *J. Catal.* **198** (2001) 319-327.
255. S. Sajip, J.K. Bartley, A. Burrows, C. Rhodes, J.C. Volta, C.J. Kiely and G.J. Hutchings, 'Structural transformation sequence occurring during the activation under n-butane-air of a cobalt-doped vanadium phosphate hemihydrate precursor for mild oxidation to maleic anhydride', *Phys. Chem. Chem. Phys.*, **3** (2001) 2143-2147.
256. M.D. Allen, G.J. Hutchings and M. Bowker, 'Iron Antimony Oxide Catalysts for the Ammoxidation of Propene to Acrylonitrile : Comments on the method of preparation of tellurium promoted catalysts', *Appl. Catal. A*, **217** (2001) 33-39.
257. J.E. Bailie, H.A. Abdullah, J.A. Anderson, C.H. Rochester, N.V. Richardson, N. Hodge, J.-G. Zhang, A. Burrows, C.J. Kiely and G.J. Hutchings, 'Hydrogenation of but-2-enal over supported gold catalysts', *Phys. Chem. Chem. Phys.*, **3** (2001) 4113-4121.
258. F. Javier Cabello Sanchez, Richard P.K. Wells, Colin Rhodes, Christopher J. Kiely and Graham J. Hutchings, '*in situ* Laser Raman spectroscopy studies of the transformation of VOHPO<sub>4</sub>.0.5H<sub>2</sub>O and (VO)<sub>2</sub>P<sub>2</sub>O<sub>7</sub>', *Phys. Chem. Chem. Phys.*, **3** (2001) 4122-4128.
259. S. Taylor, J. Gullick, P. McMorn, D. Bethell, P.C.B. Page, F.E. Hancock, F. King and G.J. Hutchings, 'Catalytic heterogeneous aziridination of styrene using CuHY catalyst: an assessment of catalyst stability', *JCS Perkin Trans. 2*, (2001) 1724-1728.
260. S. Taylor, J. Gullick, P. McMorn, D. Bethell, P.C. Bulman Page, F.E. Hancock, F. King and G.J. Hutchings, 'Catalytic asymmetric heterogeneous aziridination of styrene using CuHY : effect of nitrene donor on enantioselectivity', *JCS Perkin Trans. 2*, (2001) 1714-1723.
261. P.C.B. Page, G.J. Hutchings and D. Bethell, 'Enantioselective heterogeneous catalysis using modified zeolite catalysis', *Chimica Oggi*, **19** (2001) 14-17.
262. C.A. Cooper, C.R. Hammond, G.J. Hutchings, S.H. Taylor, D.J. Willock and K. Tabata, 'The role of gallium oxide in methane partial oxidation catalysts: an experimental and theoretical study', 6<sup>th</sup> NGCS proceedings, *Stud. Surf. Sci.*, **136** (2001) 319-324.
263. J. West, B.P. Williams, N. Young, C. Rhodes and G.J. Hutchings, 'Low temperature hydrolysis of carbonyl sulfide using  $\gamma$ -alumina catalysts', *Cat. Lett.*, **74** (2001) 111-114.
264. G.W. Watson, R.P.K. Wells, D.J. Willock, G.J. Hutchings "A comparison of the adsorption and diffusion of hydrogen on the {111} surfaces of Ni, Pd and Pt from density functional theory calculations", *J. Phys. Chem. B*, **105**, No 21 (2001) 4889-4894.
265. J. West, B.P. Williams, N. Young, C. Rhodes and G.J. Hutchings, 'Ni- and Zn-promotion of  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> for the hydrolysis of COS under mild conditions', *Catal. Comm.*, **2** (2001) 135-138.

266. J.K. Bartley, I.J. Ellison, A. Delimitis, C.J. Kiely, C. Rhodes and G.J. Hutchings, 'Comparison of vanadium phosphate catalysts derived from  $\text{VOPO}_4 \cdot 2\text{H}_2\text{O}$  prepared from  $\text{H}_3\text{PO}_4$  and  $\text{H}_4\text{P}_2\text{O}_7$ ', *Phys. Chem Chem. Phys.*, **3** (2001) 4606-4613.
267. P. Laidlaw, D. Bethell, S.M. Brown and G.J. Hutchings, 'Benzoylation of substituted arenes using Zn- and Fe-exchanged zeolites as catalysts', *J. Mol. Cat. A*, **174** (2001) 187-191.
268. C.A. Cooper, C.R. Hammond, G.J. Hutchings, S.H. Taylor, D.J. Willock and K. Tabata, 'A combined experimental and theoretical approach to the study of methane activation over oxide catalysts', *Catal. Today*, **71** (2001) 3-10.
269. J.E. Bailie and G.J. Hutchings, 'Promotion by sulfur of Ag/ZnO catalysts for the hydrogenation of but-2-enal', *Catal. Commun.*, **2** (2001) 291-294.
270. M. Johns, P. Landon, A. Alderson and G.J. Hutchings, 'Decreased methane formation from the hydrogenation of carbon monoxide using zeolite/cobalt-manganese oxide composite catalysts', *Chem. Commun.*, (2001) 2454-2455.
271. G.J. Hutchings, C. Langham, P. Piaggio, S. Taylor, P. McMorn, D.J. Willock, D. Bethell, P.C.B. Page, C. Sly, F. Hancock and F. King, 'Catalytic aziridination and epoxidation of alkenes using modified microporous and mesoporous materials', 'Supported catalysts and their application' RSC (Ed. D. Sherrington) **266** (2001) 94-103.
272. J. Gullick, S. Taylor, O. Kerton, P. McMorn, F. King, F.E. Hancock, D. Bethell, P.C.B. Page and G.J. Hutchings, 'Heterogeneous catalytic aziridination of styrene using transition metal-exchanged zeolite Y', *Cat. Lett.*, **75** (2001) 151-154.
273. S.H. Taylor, R.H. Harris, G.J. Hutchings and I. Hudson, 'The Activity, Mechanism and Water as a Promoter of Uranium Oxide Catalysts for Destruction of Volatile Organic Compounds' in "Interfacial Applications of Environmental Engineering", Marcel Dekker **108** (2002) 215-230.
274. J. Cabello Sanchez, J.A. Lopez-Sanchez, R.P.K. Wells, C. Rhodes and G.J. Hutchings, 'Effect of group 13 compounds and bulky organic oxygenates as structural promoters for the selective oxidation of n-butane with vanadium phosphorus oxide catalysts', *New J. Chem.*, **25** (2001) 1528-1536.
275. D. Freeman, R.P.K. Wells and G.J. Hutchings, 'Methanol to hydrocarbons: enhanced aromatic formation using a composite  $\text{Ga}_2\text{O}_3/\text{H-ZSM-5}$  catalyst', *Chem Comm.*, (2001) 1754-1755.
276. A. Delimitis, A. Burrows, C.J. Kiely, L. Sartoni, G.J. Hutchings and J.C. Volta, 'The effect of Ga-doping on the structure and performance of vanadium phosphorus oxide catalysts', *Inst. Phys. Conf. Ser.*, **168** (2001) 405.
277. F.J. Cabello Sanchez, J.A. Lopez-Sanchez, R.P.K. Wells, C. Rhodes, A.-Z. Isfahani and G.J. Hutchings. 'Effect of dehydration of  $\text{VOPO}_4 \cdot 2\text{H}_2\text{O}$  on the preparation and reactivity of vanadium phosphate catalyst for the oxidation of n-butane', *Cat. Lett.*, **77** (2001) 189-192.
278. P. Laidlaw, D. Bethell, S.M. Brown and G.J. Hutchings, 'Sulfonylation of substituted benzenes using Zn-exchanged zeolites', *J. Mol. Cat. A.*, **178** (2002) 205-209.
279. D. Freeman, R.P.K. Wells and G.J. Hutchings, 'Conversion of Methanol to Hydrocarbons over  $\text{Ga}_2\text{O}_3/\text{H-ZSM-5}$  and  $\text{Ga}_2\text{O}_3/\text{WO}_3$  catalysts', *J. Catal.*, **205** (2002) 358-365.
280. J.E. Bailie and G.J. Hutchings, 'Effect of thiophene modification on supported metal catalysts for the hydrogenation of but-2-enal', *J. Mol. Cat. A*, **177** (2002) 209-214.
281. R. Tanner, P. Gill, R.P.K. Wells, G. Kelly, S.D. Jackson and G.J. Hutchings 'Aldol condensation reactions of acetone and formaldehyde over vanadium phosphate catalysts : Comments on the acid-base properties', *Phys. Chem. Chem. Phys.*, **4** (2002) 688-695.
282. J.A. Lopez-Sanchez, P. Collier, C. Rhodes and G.J. Hutchings, 'Acetic acid stability in the presence of oxygen over vanadium phosphate catalysts: Comments on the design of catalysts for the selective oxidation of ethane', *Appl. Catal. A*, **226** (2002) 323-327.
283. J. Gullick, S. Taylor, P. McMorn, D. Bethell, P.C.B. Page, F.E. Hancock, F. King and G.J. Hutchings, 'Aziridination of styrene : comparison of [N-(p-tolylsulfonyl)imino] phenliodinane and chloramine-T as nitrene donors', *J. Mol. Cat. A*, **180** (2002) 85-89.
284. J.S.J. Hargreaves, G.J. Hutchings, R.W. Joyner and S.H. Taylor, 'A study of the methane-deuterium exchange reaction over a range of metal oxides', *Appl. Catal. A*, **227** (2002) 191-200.
285. S. Golunski, R. Rajaram, N. Hodge, G.J. Hutchings and C.J. Kiely, 'Low-temperature redox activity in co-precipitated catalysts: a comparison between gold and platinum-group metals', *Catal. Today*, **72** (2002) 107-113.

286. N.A. Hodge, C.J. Kiely, R. Whyman, M.R.H. Siddiqui, G.J. Hutchings, Q.A. Pankhurst, F.E. Wagem, R.R. Rajaram and S.E. Golunski, 'Microstructural comparison of calcined and uncalcined gold/iron oxide catalysts for low-temperature CO oxidation', *Catal. Today*, **72** (2002) 133-144.
287. G.J. Hutchings, 'Gold catalysis in chemical processing', *Catal. Today*, **72** (2002) 11-17.
288. R.P.K. Wells, N.R. McGuire, X. Li, R.L. Jenkins, P.J. Collier, R. Whyman and G.J. Hutchings, 'The effect of water on the enantioselective hydrogenation of ethyl pyruvate and butane-2,3-dione using cinchona-modified Pt/Al<sub>2</sub>O<sub>3</sub>', *Phys. Chem. Chem. Phys.*, **4** (2002) 2839-2845.
289. G.J. Hutchings, J.A. Lopez-Sanchez, J.K. Bartley, J.M. Webster, A. Burrows, C.J. Kiely, A.F. Carley, C. Rhodes, M. Hävecker, A. Knop-Gericke, R.W. Mayer, Robert Schlögl, J.C. Volta and M. Poliakoff, 'Amorphous Vanadium Phosphate Catalysts Prepared using Precipitation with Supercritical CO<sub>2</sub> as an Antisolvent', *J. Catal.*, **208** (2002) 197-210.
290. J. Gullick, S. Taylor, P. McMorn, D. Bethell, P.C. Bulman-Page, F.E. Hancock, F. King and G.J. Hutchings, 'Heterogeneous aziridination of styrene using [N-(p-nitrophenylsulfonyl)imino]phenyliodinane as nitrene donor: influence of the reaction parameters on yield and enantioselectivity', *J. Mol. Cat. A*, **182** (2002) 571-575.
291. S. Carretin, P. McMorn, P. Johnston, K. Griffin and G.J. Hutchings, 'Selective oxidation of glycerol to glyceric acid using a gold catalyst', *Chem. Commun.*, (2002) 696-697.
292. L.J. Schofield, O.J. Kerton, P. McMorn, D. Bethell, S. Ellwood and G.J. Hutchings, 'Oxidation of  $\alpha$ -hydroxy containing monoterpenes using titanium silicate catalysts: comments on regioselectivity and the role of acidity', *J. Chem. Soc., Perkin Trans. 2*, (2002) 1475-1481.
293. J.A. Lopez-Sanchez, J.K. Bartley, R.P.K. Wells, C. Rhodes and G.J. Hutchings 'Preparation of high surface area vanadium phosphate catalysts using water as solvent', *New J. Chem.*, **26** (2002) 1613-1618.
294. J.A. Lopez-Sanchez, J.K. Bartley, A. Burrows, C.J. Kiely, M. Hävecker, R. Schlögl, J.C. Volta, M. Poliakoff and G.J. Hutchings, 'Effects of cobalt additive on amorphous vanadium phosphate catalysts prepared using precipitation with supercritical CO<sub>2</sub> as an antisolvent', *New J. Chem.*, **26** (2002) 1811-1816.
295. L. Thomas, R. Tanner, P. Gill, R.P.K. Wells, J.E. Bailie, G. Kelly, S.D. Jackson and G.J. Hutchings 'Aldol condensation reactions of acetone over alkali-modified vanadium phosphate catalysts', *Phys. Chem. Chem. Phys.*, **4** (2002) 4555-4560.
296. R.H. Harris, V.J. Boyd, G.J. Hutchings and S.H. Taylor, 'Water as a promoter of the complete oxidation of volatile organic compounds over uranium oxide catalysts', *Catal. Lett.*, **78** (2002) 369.
297. P. Landon, P.J. Collier, A.J. Papworth, C.J. Kiely and G.J. Hutchings, 'Direct formation of hydrogen peroxide from H<sub>2</sub>/O<sub>2</sub> using a gold catalyst', *Chem. Commun.*, (2002) 2058-2059.
298. C.J. Kiely, M.A. Edwards, D.M. Whittle, C. Rhodes and G.J. Hutchings, 'Microstructural studies of the chromia stabilised iron oxide water gas shift catalyst', *Microscopy Microanal.*, **8** (2002) 1390-1391.
299. D.M. Whittle, A.A. Mirzaei, J.S.J. Hargreaves, R.W. Joyner, C.J. Kiely, S.H. Taylor and G.J. Hutchings, 'Co-precipitated copper zinc oxide catalysts for ambient temperature carbon monoxide oxidation: effect of precipitate ageing on catalyst activity', *Phys. Chem. Chem. Phys.*, **4** (2002) 5915-5920.
300. C. Rhodes, B.P. Williams, F. King and G.J. Hutchings, 'Promotion of Fe<sub>3</sub>O<sub>4</sub>/Cr<sub>2</sub>O<sub>3</sub> High Temperature Water Gas Shift Catalyst', *Cat. Comm.*, **3** (2002) 381-384.
301. L.J. Schofield, O.J. Kerton, P. McMorn, D. Bethell, S. Ellwood and G.J. Hutchings, 'Shape selective oxidation using titanium silicates: epoxidation of dihydromyrcene and the model compounds 2-methyl-2-pentene and 3-methyl-1-pentene', *J. Chem. Soc., Perkin Trans. 2*, (2002) 2064-2971.
302. M.A. Edwards, D.M. Whittle, C. Rhodes, A.M. Ward, D. Rohan, M.D. Shannon, G.J. Hutchings and C.J. Kiely, 'Microstructural studies of the copper promoted iron oxide/chromia water-gas shift catalyst', *Phys. Chem. Chem. Phys.*, **4** (2002) 3902-3908.
303. A.A. Mirzaei, H.R. Shaterian, R.W. Joyner, M. Stockenhuber, S.H. Taylor and G.J. Hutchings, 'Ambient temperature carbon monoxide oxidation using copper manganese oxide catalysts: effect of residual Na<sup>+</sup> acting as catalyst poison', *Catal. Comm.*, **4** (2003) 17-20.

304. P. Landon, P. J. Collier, D. Chadwick, A. J. Papworth, A. Burrows, C. J. Kiely, and G. J. Hutchings, 'Direct synthesis of hydrogen peroxide from H<sub>2</sub> and O<sub>2</sub> using Pd and Au catalysts', *Phys. Chem. Chem. Phys.*, **5** (2003) 1917-1923.
305. S. Carrettin, P. McMorn, P. Johnston, K. Griffin, C.J. Kiely and G.J. Hutchings, 'Oxidation of glycerol using supported Pt, Pd and Au catalysts', *Phys. Chem. Chem. Phys.*, **5** (2003) 1329-1336.
306. B. Thomas, B.P. Williams, N. Young, C. Rhodes and G.J. Hutchings, 'Ambient temperature hydrolysis of carbonyl sulfide using  $\gamma$ -alumina catalysts: effect of calcination temperature and alkali doping', *Catal. Lett.*, **86** (2003) 201-205.
307. C. Rhodes and G. J. Hutchings 'Studies of the role of the copper promoter in the iron oxide/chromia high temperature water gas shift catalyst', *Phys. Chem. Chem. Phys.*, **5** (2003) 2719-2723.
308. A.A. Mirzaei, H.R. Shaterian, S.H. Taylor and G.J. Hutchings, 'Co-precipitated copper zinc oxide catalysts for ambient temperature carbon monoxide oxidation: effect of precipitate aging atmosphere on catalyst activity', *Catal. Lett.*, **87** (2003) 103-108.
309. M. von Arx, N. Dummer, D. J. Willock, S. H. Taylor, R. P.K. Wells, P. B. Wells and G. J. Hutchings, 'Observation of high enantioselectivity for the gas phase hydrogenation of methyl pyruvate using supported Pt catalysts pre-modified with cinchonidine', *Chem. Commun.*, (2003) 1926-1927.
310. J.A. Lopez-Sanchez, L. Griesel, J.K. Bartley, R.P.K. Wells, A. Liskowski, D. Su, R. Schlögl, J.-C. Volta and G.J. Hutchings, 'High temperature preparation of vanadium phosphate catalysts using water as solvent', *Phys. Chem. Chem. Phys.*, **5** (2003) 3525-3533.
311. J.K. Bartley, J.A. Lopez-Sanchez and G.J. Hutchings, 'Preparation of vanadium phosphate catalysts using water as solvent', *Catal. Today*, **81** (2003) 197-203.
312. Matthias von Arx and Graham J. Hutchings, 'New molecularly modified noble metal catalysts for gas phase hydrogenation reactions', *New J. Chem.*, **27** (2003) 1367-1370.
313. X. Li, R. P.K. Wells, P. B. Wells and G. J. Hutchings, 'New insights into the relationship between conversion and enantioselectivity for the asymmetric hydrogenation of alkyl pyruvate' *J. Catal.*, **221** (2003) 653-656.
314. Y. Wan, P. McMorn, F. E. Hancock and G. J. Hutchings, 'Heterogeneous enantioselective synthesis of a dihydropyran using Cu-exchanged microporous and mesoporous materials modified by bis(oxazoline)', *Catal. Lett.*, **91** (2003) 145-148.
315. S. H. Taylor, G. J. Hutchings and A. A. Mirzaei, 'The preparation and activity of copper zinc oxide catalysts for ambient temperature carbon monoxide oxidation', *Catal. Today*, **84** (2003) 113-119.
316. S.H. Taylor, G.J. Hutchings, M.-L. Palacio and D.F. Lee, 'The partial oxidation of propane to formaldehyde using uranium mixed oxide catalysts', *Catal. Today*, **81** (2003) 171-178.
317. J. Gullick, S. Taylor, D. Ryan, P. McMorn, M. Coogan, D. Bethell, P. C. Bulman Page, F. E. Hancock, F. King and G. J. Hutchings, 'Observation of the enhancement in enantioselectivity with conversion for the aziridination of styrene using copper bis(oxazoline) complexes', *Chem. Commun.*, (2003) 2808-2809.
318. C. Hammond, G. J. Hutchings, D. J. Willock and S. H. Taylor, 'A study of methane activation by modified gallium- and zinc-based catalysts', *Res. Chem. Intermed.*, (2003)
319. S. Taylor, J. Gullick, N. Galea, P. McMorn, D. Bethell, P. C. Bulman Page, F. E. Hancock, F. King and G. J. Hutchings, 'Catalytic asymmetric heterogeneous aziridination using CuHY/bis(oxazoline): effect of reaction conditions on enantioselectivity', *Topics Catal.*, **25** (2003) 81-88.
320. X. Li, R.P.K. Wells, P.B. Wells and G.J. Hutchings, 'Premodification of Pt/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> with cinchonidine for the enantioselective hydrogenation of ethyl pyruvate: effect of premodification conditions on reaction rate and enantioselection', *Catal. Lett.*, **89** (2003) 163-167.
321. S. Taylor, J. Gullick, P. McMorn, D. Bethell, P. C. Bulman Page, F. E. Hancock, F. King and G. J. Hutchings, 'Catalytic asymmetric heterogeneous aziridination of styrene using CuHY/bis(oxazoline): comments on the factors controlling enantioselectivity', *Topics Catal.*, **24** (2003) 43-50.
322. M. Johns, P. Collier, M. S. Spencer, A. Alderson and G. J. Hutchings, "Combined steam reforming of methane and Fischer-Tropsch synthesis for the formation of hydrocarbons: A proof of concept study", *Catal. Letts*, **90** (2003) 187-194.
323. B. Zhang, S. H. Taylor and G. J. Hutchings, 'Synthesis of methyl mercaptan and thiophene from CO/H<sub>2</sub>/H<sub>2</sub>S using  $\alpha$ -Al<sub>2</sub>O<sub>3</sub>', *Catal. Letts.*, **91** (2003) 181-183.

324. B. Zhang, S. H. Taylor and G. J. Hutchings, 'Catalytic synthesis of methanethiol from CO/H<sub>2</sub>/H<sub>2</sub>S mixtures using  $\alpha$ -Al<sub>2</sub>O<sub>3</sub>, *New J. Chem.* **28** (2004) 471-476.
325. S. Carretin, P. McMorn, P. Johnston, K. Griffin, C.J. Kiely, G.A. Attard and G.J. Hutchings, 'Oxidation of glycerol using supported Au catalysts' *Topics Catal.* **27**, (2004) 131-136.
326. M. Hävecker, R.W. Mayer, A. Knop-Gericke, H. Bluhm, E. Kleimenov, A. Liskowski, D. Su, R. Follath, F.G. Requejo, D.R. Ogletree, M. Salmeron, J.A. Lopez-Sanchez, J.K. Bartley, G.J. Hutchings and R. Schlögl, 'In situ investigation of the nature of the active surface of a vanadyl pyrophosphate catalyst during *n*-butane oxidation to maleic anhydride', *J. Phys. Chem. B*, **107** (2003) 4587-4596.
327. X. Li, R.P.K. Wells, P.B. Wells and G.J. Hutchings, 'New insights into the relationship between conversion and enantioselectivity for the asymmetric hydrogenation of alkyl pyruvate' *J. Catal.*, **221** (2004) 653-656.
328. N. A. Caplan, F. E. Hancock, P.C. Bulman-Page and G. J. Hutchings, 'Heterogeneous Enantioselective Catalysed Carbonyl- and Imino-ene Reactions using Copper bis(oxazoline) Zeolite Y' *Angew. Chem. Int. Ed.*, **43** (2004) 1685-1688.
329. X. Li, N. Dummer, R. Jenkins, R.P.K. Wells, P.B. Wells, D.J. Willock, S.H. Taylor, P. Johnston and G.J. Hutchings, 'Enantioselective hydrogenation using cinchona-modified Pt/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalysts: comparison of the reaction of ethyl pyruvate and buta-2,3-dione, *Catal. Lett.*, **96** (2004) 147-151.
330. B. Solsona, G.J. Hutchings, T. Garcia and S. H. Taylor, 'Improvement in the catalytic performance of CuMnO<sub>x</sub> catalysts for CO oxidation by the addition of Au' *New J. Chem.*, **28** (2004) 708-711.
331. J. Gullick, D. Ryan, P. McMorn, D. Bethell, F. King, F.E. Hancock, and G.J. Hutchings, "Catalytic asymmetric heterogeneous aziridination of styrene using Cu<sup>2+</sup>-exchanged zeolite Y: effect of the counter-cation on enantioselectivity and on the reaction profile" *New J. Chem.* **28** (2004) 1470-1478.
332. D. Ryan, P. McMorn, D. Bethell, and G.J. Hutchings, "Catalytic asymmetric heterogeneous aziridination of styrene derivatives using bis(oxazoline)-modified Cu<sup>2+</sup>-exchanged zeolite Y" *Org. Biomol. Chem.* **2** (2004) 3566-3572.
333. L. Griesel, J.K. Bartley, R.P.K. Wells, and G.J. Hutchings, "Preparation of vanadium phosphate catalysts from VOPO<sub>4</sub>.2H<sub>2</sub>O: effect of VOPO<sub>4</sub>.2H<sub>2</sub>O preparation on catalyst performance" *J. Molec. Cat. A: Chemical* **220** (2004) 113-119.
334. L. Sartoni, J.K. Bartley, R.P.K. Wells, C.J. Kiely, J.C. Volta, and G.J. Hutchings, "Promotion of vanadium phosphate catalysts using gallium compounds: effect of low Ga/V molar ratios" *J. Molec. Cat. A: Chemical* **220** (2004) 85-92.
335. N. Song, C. Rhodes, D.W. Johnson, and G.J. Hutchings, "Comments on the characterisation of oxidation catalysts using TPR/TPO" *Catal. Lett.* **102** (2005) 271-279.
336. B.E. Solsona, M. Conte, Y. Cong, A.F. Carley, and G.J. Hutchings, "Unexpected promotion of Au/TiO<sub>2</sub> by nitrate for CO oxidation." *Chem. Comm.* (2005) 2351-2353.
337. E.L. Jeffery, R.K. Mann, G.J. Hutchings, S.H. Taylor, and D.J. Willock, "A density functional theory study of the adsorption of acetone to the (111) surface of Pt: Implications for hydrogenation catalysis" *Catal. Today* **105** (2005) 85-92.
338. O.J. Kerton, P. McMorn, D. Bethell, F. King, F.E. Hancock, A. Burrows, C.J. Kiely, S. Ellwood, and G.J. Hutchings, "Effect of structure of the redox molecular sieve TS-1 on the oxidation of phenol, crotyl alcohol and norbornylene. *Phys. Chem. Chem. Phys.* **7** (2005), 2671-2678.
339. D.I. Enache, G.J. Hutchings, S.H. Taylor, R. Natividad, S. Raymahasay, J.M. Winterbottom, and H.E. Stitt, "Experimental Evaluation of a Three-Phase Downflow Capillary Reactor" *Ind. Eng. Chem. Res.* **44** (2005) 6295-6303.
340. Y.-J. Xu, P. Landon, D.I. Enache, A.F. Carley, M.W. Roberts, and G.J. Hutchings, "Selective conversion of cyclohexane to cyclohexanol and cyclohexanone using a gold catalyst under mild conditions" *Catal. Lett.* **101** (2005) 175-179.
341. P. Landon, J. Ferguson, B.E. Solsona, T. Garcia, A.F. Carley, A.A. Herzing, C.J. Kiely, S.E. Golunski, and G.J. Hutchings, "Selective oxidation of CO in the presence of H<sub>2</sub>, H<sub>2</sub>O and CO<sub>2</sub> via gold for use in fuel cells" *Chem. Comm.* (2005) 3385-3387.
342. W.-S. Dong, J.K. Bartley, N.Song, and G.J. Hutchings, "Synthesis and Characterisation of Vanadyl Hydrogen Phosphite Hydrate" *Chem. Mat.* **17** (2005) 2757-2764.

343. R.L. Jenkins, P. McMorn, and G.J. Hutchings, "Continuous stable enantioselective hydrogenation of alkyl pyruvate esters using pre-modified cinchonidine platinum catalysts" *Catal. Lett.* **100** (2005) 255-258.
344. R. Tanner, D.I. Enache, R.P.K. Wells, G. Kelly, J. Casci, and G.J. Hutchings, "Comments on the use of 2-methylbut-3-yn-2-ol decomposition as a probe reaction for the potential reactivity Mg-Al hydrotalcites as base catalysts" *Catal. Lett.* **100** (2005) 259-265.
345. L. Griesel, J.K. Bartley, R.P.K. Wells, and G.J. Hutchings, "Preparation of vanadium phosphate catalyst precursors using a high pressure method" *Catal. Today*, **99** (2005) 131-136.
346. Y. Zhao, A. Mpela, D.I. Enache, S.H. Taylor, D. Hildebrandt, D. Glasser, and G.J. Hutchings and M.S. Scurrall, "Study of carbon monoxide hydrogenation over Au supported on zinc oxide catalysts" *Prepr. A.C.S., Div. Petr. Chem.* **50** (2005) 206-207.
347. M.D. Hughes, Y.-J. Xu, P. Jenkins, P. McMorn, P. Landon, D.I. Enache, A.F. Carley, G.A. Attard, G.J. Hutchings, F. King, E.H. Stitt, P. Johnston, K. Griffin and C.J. Kiely, "Tunable gold catalysts for selective hydrocarbon oxidation under mild conditions", *Nature* **437** (2005) 1132-1135.
348. L. Sartoni, J.K. Bartley, R.P.K. Wells, A. Delimitis, A. Burrows, C.J. Kiely, J.C. Volta and G.J. Hutchings, "Unexpected enhanced activity catalysts for butane oxidation using mixtures derived from VOHPO<sub>4</sub>·0.5H<sub>2</sub>O and AlPO<sub>4</sub>", *J. Mat. Chem.* **15** (2005) 4295-4297.
349. W.S. Dong, J.K. Bartley, F. Girgsdies, R. Schlögl, and G.J. Hutchings, "The hydration and transformation of vanadyl pyrophosphate," *J. Mat. Chem.* **15** (2005) 4147-4153.
350. D.I. Enache, D.W. Knight, and G.J. Hutchings, "Solvent-free Oxidation of Primary Alcohols to Aldehydes using Supported Gold Catalysts," *Catal. Lett.* **103** (2005) 43-52.
351. N.J. Colston, R.P.K. Wells, P.B. Wells and G.J. Hutchings, "Unexpected Inversion in Enantioselectivity in the Hydrogenation N-acetyl Dehydrophenylalanine Methyl Ester using Cinchona-Modified Pd/Al<sub>2</sub>O<sub>3</sub> catalyst," *Catal. Lett.* **103** (2005) 117-120.
352. H. Huang, N. Young, B.P. Williams, S.H. Taylor and G.J. Hutchings, "COS Hydrolysis Using Zinc-promoted Alumina Catalysts," *Catal. Lett.* **104** (2005) 17-21.
353. W.S. Dong, J.K. Bartley, N.F. Dummer, F. Girgsdies, D. Su, R. Schlögl, J.C. Volta and G.J. Hutchings, "Reaction of vanadium phosphates with alcohols at elevated temperature and pressure," *J. Mat. Chem.* **15** (2005) 3214-3220.
354. D.I. Enache, G.J. Hutchings, S.H. Taylor and H.E. Stitt, "The hydrogenation of isophorone to trimethyl cyclohexanone using the downflow single capillary reactor," *Catal. Today* **105** (2005) 569-573.
355. N. Song, C. Rhodes, D.W. Johnson, and G.J. Hutchings, "Comments on the characterisation of oxidation catalysts using TPR/TPO" *Catal. Lett.* **102** (2005) 271-279.
356. B.E. Solsona, M. Conte, Y. Cong, A.F. Carley, and G.J. Hutchings, "Unexpected promotion of Au/TiO<sub>2</sub> by nitrate for CO oxidation." *Chem. Comm.* (2005) 2351-2353.
357. E.L. Jeffery, R.K. Mann, G.J. Hutchings, S.H. Taylor, and D.J. Willock, "A density functional theory study of the adsorption of acetone to the (111) surface of Pt: Implications for hydrogenation catalysis" *Catal. Today* **105** (2005) 85-92.
358. O.J. Kerton, P. McMorn, D. Bethell, F. King, F.E. Hancock, A. Burrows, C.J. Kiely, S. Ellwood, and G.J. Hutchings, "Effect of structure of the redox molecular sieve TS-1 on the oxidation of phenol, crotyl alcohol and norbornylene." *Phys. Chem. Chem. Phys.* **7** (2005), 2671-2678.
359. D.I. Enache, G.J. Hutchings, S.H. Taylor, R. Natividad, S. Raymahasay, J.M. Winterbottom, and H.E. Stitt, "Experimental Evaluation of a Three-Phase Downflow Capillary Reactor" *Ind. Eng. Chem. Res.* **44** (2005) 6295-6303.
360. Y.-J. Xu, P. Landon, D.I. Enache, A.F. Carley, M.W. Roberts, and G.J. Hutchings, "Selective conversion of cyclohexane to cyclohexanol and cyclohexanone using a gold catalyst under mild conditions" *Catal. Lett.* **101** (2005) 175-179.
361. D.I. Enache, J. K. Edwards, P. Landon, B. Solsona-Espriu, A. F. Carley, A. A. Herzing, M. Watanabe, C. J. Kiely, D. W. Knight and G. J. Hutchings, "Solvent-free oxidation of primary alcohols to aldehydes using titania-supported gold-palladium catalysts", *Science*, **311** (2006) 362-365.
362. G.J. Hutchings, M.S. Hall, A.F. Carley, P. Landon, B.E. Solsona, C.J. Kiely, A. Herzing, M. Mckee, J.A. Moulijn, A. Overweg, J.C. Fierro-Gonzalez, J. Guzman and B.C. Gates, "Role of gold cations in

- the oxidation of carbon monoxide catalyzed by iron oxide-supported gold” *J. Catal.*, **242** (2006) 71-81.
- 363 F. Girgsdies, W.-S Dong, J. K. Bartley, G. J. Hutchings, R. Schloegl and T. Ressler, “The crystal structure of  $\omega$ -VOPO<sub>4</sub>” *Solid State Sciences* **8** (2006) 807-812.
- 364 R. Coquet, G.J. Hutchings, S.H. Taylor and D.J. Willock, “Calculations on the adsorption of Au to MgO surfaces using SIESTA” *J. Mat. Chem.* **16** (2006) 1978-1988.
- 365 G. Li, J.K. Edwards, A.F. Carley and G.J. Hutchings, “Direct synthesis of hydrogen peroxide from H<sub>2</sub> and O<sub>2</sub> using zeolite-supported Au catalysts” *Catal. Today* **114** (2006) 369-371.
- 366 N.J. Coulston, R.P.K. Wells, P.B. Wells and G.J. Hutchings “Enantioselective hydrogenation of N-acetyl dehydrophenylalanine methyl ester using cinchonine-modified Pd/TiO<sub>2</sub> catalysts” *Catal. Today* **114** (2006) 353-356.
- 367 B.E. Solsona, J.K. Edwards, P. Landon, A.F. Carley, A. Herzing, C.J. Kiely and G.J. Hutchings, “Direct Synthesis of Hydrogen Peroxide from H<sub>2</sub> and O<sub>2</sub> Using Al<sub>2</sub>O<sub>3</sub> Supported Au-Pd Catalysts” *Chem. Mater.* **18** (2006), 2689-2695.
- 368 G.J. Hutchings, S. Carretin, P. McMorn, P. Jenkins, G.A. Attard, P. Johnston, K. Griffin and C.J. Kiely, “Cyclic voltammetry as a potential predictive method for supported nanocrystalline gold catalysts for oxidation in aqueous media” *ACS Symp. Ser.* **921** (2006), (Feedstocks for the Future), 82-98.
- 369 Y. H. Taufiq-Yap, A. R. M. Hasbi, M. Z Hussein, G. J. Hutchings, J.K. Bartley and N.F. Dummer, “Synthesis of vanadium phosphate catalysts by hydrothermal method for selective oxidation of n-butane to maleic anhydride” *Catal. Lett.* **106** (2006) 177-181.
- 370 N. Song, Z. Xuan, J.K. Bartley, S.H. Taylor, D. Chadwick and G.J. Hutchings, “Oxidation of Butane to Maleic Anhydride using Vanadium Phosphate Catalysts: Comparison of Operation in Aerobic and Anaerobic Conditions using a Gas-gas Periodic Flow Reactor” *Catal. Lett.* **106** (2006) 127-131.
- 371 P. Landon, J. Ferguson, B.E. Solsona, T. Garcia, S. Al-Sayari, A.F. Carley, A. Herzing, C.J. Kiely, M. Makkee, J.A. Moulijn, A. Overweg, S.E. Golunski and G.J. Hutchings, “Selective oxidation of CO in the presence of H<sub>2</sub>, H<sub>2</sub>O and CO<sub>2</sub> utilising Au/ $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> catalysts for use in fuel cells” *J. Mat. Chem.* **16** (2006) 199-208.
- 372 M. Conte, G. Budroni, J. K. Bartley, S. H. Taylor, A. F. Carley, A. Schmidt, D. M. Murphy, F. Girgsdies, T. Ressler, R. Schlögl, and G. J. Hutchings “Chemically Induced Fast Solid State Transitions of  $\omega$ -VOPO<sub>4</sub> in Vanadium Phosphate Catalysts”, *Science*, **313** (2006) 1270-1273.
- 373 G.J Hutchings, S. Carretin, P. Landon, J.K. Edwards, D. Enache, D.W. Knight, Y.J. Xu and A.F. Carley, “New approaches to designing selective oxidation catalysts: Au/C a versatile catalyst” *Topics Catal.*, **38** (2006) 223-230.
- 374 G. Li, D.I. Enache, J.K. Edwards, A.F. Carley, D.W. Knight and G.J. Hutchings, “Solvent-free oxidation of benzyl alcohol with oxygen using zeolite-supported Au and Au-Pd catalysts” *Cat. Lett.*, **110** (2006) 7-13.
- 375 R.L. Jenkins, N. Dummer, X.B. Li, S.M. Bawaked, P. McMorn, R.P.K. Wells, A. Burrows, C.J. Kiely and G.J. Hutchings, “Unexpected inversion of enantioselectivity during the hydrogenation of ethyl pyruvate using hydroquinine and hydroquinidine modified Pt/Al<sub>2</sub>O<sub>3</sub>” *Catal. Lett.*, **110** (2006) 135-138.
- 376 Y.H. Taufiq-Yap, C.K. Goh, G.J. Hutchings, N. Dummer and J.K. Bartley, “Effects of mechanochemical treatment to the vanadium phosphate catalysts derived from VOPO<sub>4</sub>.2H<sub>2</sub>O” *J. Molec. Catal., A*, **260** (2006) 24-31.
- 377 L. Sartoni, A. Delimitis, J.K. Bartley, A. Burrows, H. Roussel, J.M. Herrman, J.C. Volta, C.J. Kiely and G.J. Hutchings, “Gallium-doped VPO catalysts for the oxidation of n-butane to maleic anhydride”, *J. Mater. Chem.*, **16** (2006) 4348-4360.
- 378 N. J. Coulston, E.L. Jeffery, R.P.K. Wells, P. McMorn, P.B. Wells, D.J. Willock and G.J. Hutchings, “Enantioselective hydrogenation of N-acetyl dehydrophenylalanine methyl ester using cinchonine-modified Pd/Al<sub>2</sub>O<sub>3</sub> catalysts”, *J. Catal.*, **243** (2006) 360-367.
- 379 N. F. Dummer, R. Jenkins, X.B. Li, S.M. Bawaked, P. McMorn, A. Burrows, C.J. Kiely, R.P.K. Wells, D.J. Willock and G.J. Hutchings, “Inversion of enantioselectivity for the hydrogenation of ethyl pyruvate in the gas-phase over Pt/SiO<sub>2</sub> modified with derivatives of hydroquinidine”, *J. Catal.*, **243** (2006) 165-170.

- 380 B. E. Solsona, T. Garcia, C. Jones, S.H. Taylor, A.F. Carley and G.J. Hutchings, "Supported gold catalysts for the total oxidation of alkanes and carbon monoxide", *Appl. Catal., A*, **312** (2006) 67-76.
- 381 G. Li, J.K. Edwards, A.F. Carley and G.J. Hutchings, "Direct synthesis of hydrogen peroxide from H<sub>2</sub> and O<sub>2</sub> and in situ oxidation using zeolite-supported catalysts", *Cat. Comm.*, **8** (2007) 247-250.
- 382 S. Al-Sayari, A.F. Carley, S.H. Taylor and G.J. Hutchings, "Au/ZnO and Au/Fe<sub>2</sub>O<sub>3</sub> catalysts for CO oxidation at ambient temperature: comments on the effect of synthesis conditions on the preparation of high activity catalysts prepared by coprecipitation" *Top. Catal.*, **44** (2007) 123-128.
- 383 K. Jalama, N.J. Coville, D. Hildebrandt, D. Glasser, L.L. Jewell, J.A. Anderson, S.H. Taylor, D. Enache and G.J. Hutchings, "Effect of the addition of Au on Co/TiO<sub>2</sub> catalyst for the Fischer-Tropsch reaction", *Top. Catal.*, **44** (2007) 129-136.
- 384 N. Dimitratos, J.A. Lopez-Sanchez, D. Morgan, A.F. Carley, L. Prati and G.J. Hutchings, "Solvent free liquid phase oxidation of benzyl alcohol using Au supported catalysts prepared using a sol immobilization technique", *Catal. Today*, **122** (2007) 317-324.
- 385 G. Li, J.K. Edwards, A.F. Carley and G.J. Hutchings, "Direct synthesis of hydrogen peroxide from H<sub>2</sub> and O<sub>2</sub> using zeolite-supported Au-Pd catalysts", *Catal. Today*, **122** (2007) 361-364.
- 386 J.K. Edwards, A. Thomas, B.E. Solsona, P. Landon, A.F. Carley and G.J. Hutchings, "Comparison of supports for the direct synthesis of hydrogen peroxide from H<sub>2</sub> and O<sub>2</sub> using Au-Pd catalysts", *Catal. Today*, **122** (2007) 397-402.
- 387 D. I Enache, D. Barker, J.K. Edwards, S.H. Taylor, D.W. Knight, A.F. Carley and G.J. Hutchings, "Solvent-free oxidation of benzyl alcohol using titanite-supported gold-palladium catalysts: Effect of Au-Pd ratio on catalytic performance", *Catal. Today*, **122** (2007) 407-411.
- 388 J.K. Edwards, P. Landon, A.F. Carley and G.J. Hutchings, "Nanocrystalline gold and gold-palladium as effective catalysts for selective oxidation" *J. Mater. Res.*, **22** (2007) 831-837.
- 389 Z.-R. Tang, J. K. Edwards, J. K. Bartley, S. H. Taylor, A. F. Carley, A. A. Herzing, C. J. Kiely, G. J. Hutchings, "Nanocrystalline cerium oxide produced by supercritical antisolvent precipitation as a support for high-activity gold catalysts", *J. Catal.*, **249** (2007) 208-219.
- 390 C.J.Kiely, A.A.Herzing, M.Watanabe, J.K.Edwards, D.I.Enache and G.J.Hutchings, "Aberration Corrected Analytical Electron Microscopy of Supported Bimetallic Catalysts", *Microscopy and Microanalysis*, **13** (2007) 864-865.
- 391 A.A.Herzing, Z- R.Tang, J.K.Edwards, D.I.Enache, J.K.Bartley, S.H.Taylor, A.F.Carley, C.J.Kiely and G.J.Hutchings, "Improved Performance Of Au-based Catalysts Using Novel Oxide Supports," *Microscopy and Microanalysis*, **13** (2007) 102-103.
- 392 D.I. Enache, W. Thiam, D. Dumas, S. Ellwood, G.J. Hutchings, S.H.Taylor, S.Hawker, E.H.Stitt, "Intensification of the solvent-free catalytic hydroformylation of cyclododecatriene: Comparison of a Stirred batch reactor and a heat-exchange reactor" *Catal. Today*, **128** (2007) 18-25
- 393 D.I.Enache, G.J.Hutchings, S.H.Taylor, S.Raymahasay, J.M.Winterbottom, M.D.Mantle, A.J.Sederman, L.F.Gladden, C.Chatwin, K.T.Symonds, E.H.Stitt, "Multiphase hydrogenation of resorcinol in structured and heat exchange reactor systems influence of the catalyst and the reactor configuration" *Catal. Today* **128** (2007) 26-35
- 394 A. Mpela, D. Hildebrandt, D.Glasser, M.S.Scurrrell, G.J.Hutchings, "Low-pressure methanol/dimethylether synthesis from syngas on gold-based catalysts" *Gold Bulletin*, **40** (2007) 219-224
- 395 M.Conte, A.F.Carley, C.Heirene, D.J.Willock, P.Johnston, A.A.Herzing, C.J.Kiely, G.J.Hutchings, "Hydrochlorination of acetylene using a supported gold catalyst: A study of the reaction mechanism", *Journal of Catalysis*, **250** (2007) 231-239
- 396 M. Conte, T. Davies, A.F. Carley, A.A. Herzing, C.J. Kiely, G. J. Hutchings, "Selective formation of chloroethane by the hydrohydrochlorination of ethane using zinc catalysts", *Journal of Catalysis*, **252** (2007) 23-29
- 397 A. A. Herzing, M. Watanabe, J. K. Edwards, M. Conte, Z.i-R. Tang, G. J. Hutchings and C. J. Kiely, "Energy dispersive X-ray spectroscopy of bimetallic nanoparticles in an aberration corrected scanning transmission electron microscope" *Faraday Disc.*, **138** (2008) 337-351 DOI: 10.1039/b706293c.

- 398 J. K. Edwards, A. F. Carley, A. A. Herzing, C. J. Kiely and G. J. Hutchings, "Direct synthesis of hydrogen peroxide from H<sub>2</sub> and O<sub>2</sub> using supported Au–Pd catalysts", *Faraday Disc.* **138** (2008) 225-229.
- 399 A.A. Herzing, A.F. Carley, J.K. Edwards, G.J. Hutchings and C.J. Kiely, "Microstructural development and catalytic performance of Au-Pd nanoparticles on Al<sub>2</sub>O<sub>3</sub> supports: The effect of heat treatment temperature and atmosphere" *Chemistry of Materials*, **20** (2008) 1492-1501
- 400 C.K. Goh, Y.H. Taufiq-Yap, G.J. Hutchings, N.K. Dummer and J. Baitley, "Influence of Bi-Fe additive on properties of vanadium phosphate catalysts for n-butane oxidation to maleic anhydride" *Catal. Today*, **131** (2008) 408-412
- 401 G.J. Hutchings, "Nanocrystalline gold and gold palladium alloy catalysts for chemical synthesis" *Chem. Comm.*, **10** (2008) 1148-1164
- 402 C. Jones, S.H. Taylor, A. Burrows, M.J. Crudace, C.J. Kiely and G.J. Hutchings, "Cobalt promoted copper manganese oxide catalysts for ambient temperature carbon monoxide oxidation" *Chem. Comm.*, **14** (2008) 1707-1709
- 403 J.A. Lopez-Sanchez, N. Dimitratos, P. Miedziak, E. Ntainjua, J.K. Edwards, D. Morgan, A.F. Carley, R. Tiruvalam, C.J. Kiely and G.J. Hutchings, "Au-Pd supported nanocrystals prepared by a sol immobilisation technique for selective chemical synthesis" *Physical Chemistry Chemical Physics*, **10** (2008) 1921-1930
- 404 J.K. Edwards, A. Thomas, A.F. Carley, A.A. Herzing, C.J. Kiely and G.J. Hutchings, "Au-Pd supported nanocrystals as catalysts for the direct synthesis of hydrogen peroxide from H<sub>2</sub> and O<sub>2</sub>" *Green Chemistry*, **10** (2008) 388-394
- 405 C.L. Xu, J.K. Bartley, D.I. Enache, D.W. Knight, M. Lunn, M. Lok and G.J. Hutchings, "On the synthesis of beta-keto-1,3-dithianes from conjugated ynones catalyzed by magnesium oxide" *Tetrahedron Letters*, **49** (2008) 2454-2456
- 406 M. Conte, A.F. Carley, G. Attard, A.A. Herzing, C.J. Kiely and G. J. Hutchings, "Hydrochlorination of acetylene using supported bimetallic Au-based catalysts" *J. Catal.*, **257** (2008) 190-198
- 407 G.J. Hutchings, "Reactions of alkynes using heterogeneous and homogeneous cationic gold catalysts" *Topics in Catalysis*, **48** (2008) 55-59
- 408 M. Conte, A.F. Carley and G.J. Hutchings, "Reactivation of a carbon-supported gold catalyst for the hydrochlorination of acetylene" *Catalysis Letters*, **124** (2008) 165-167
- 409 A.A. Herzing, C.J. Kiely, A.F. Carley, P. Landon and G.J. Hutchings, "Identification of active gold nanoclusters on iron oxide supports for CO oxidation", *Science*, **321** (2008) 1331-1335
- 410 G. J. Hutchings, M. Brust and H. Schmidbaur, "Gold – an introductory perspective" *Chemical Society Reviews*, **37** (2008) 1759-1765
- 411 G. J. Hutchings, "Nanocrystalline gold and gold palladium alloy oxidation catalysts: a personal reflection on the nature of the active sites" *Dalton Transactions*, **41** (2008) 5523-5536
- 412 G. J. Hutchings, "Supported gold and gold palladium catalysts for selective chemical synthesis" *Catalysis Today*, **138** (2008) 9-14
- 413 N. N. Edwin, J.K. Edwards, A.F. Carley, J.A. Lopez-Sanchez, J.A. Moulijn, A.A. Herzing, C.J. Kiely and G.J. Hutchings, "The role of the support in achieving high selectivity in the direct formation of hydrogen peroxide" *Green Chemistry*, **10** (2008) 1162-1169
- 414 J.K. Edwards, B. Solsona and E.N. N, A.F. Carley, A.A. Herzing, C.J. Kiely and G. J. Hutchings, "Switching Off Hydrogen Peroxide Hydrogenation in the Direct Synthesis Process" *Science*, **323** (2008) 1037-1041
- 415 418 N. Dimitratos, J.A. Lopez-Sanchez and G. J. Hutchings, "Green Catalysis with Alternative Feedstocks" *Topics in Catalysis*, **52** (2009) 258-268
- 416 G.J. Hutchings, "Catalyst Synthesis Using Supercritical Carbon Dioxide: A Green Route to High Activity Materials" *Topics in Catalysis*, **52** (2009) 982-987
- 417 C. Jones, K.J. Cole, S.H. Taylor, M.J. Crudace and G. J. Hutchings, "Copper manganese oxide catalysts for ambient temperature carbon monoxide oxidation: Effect of calcination on activity" *Journal of Molecular Catalysis A-Chemical*, **305** (2009) 121-124
- 418 Y.H. Taufiq-Yap, C.K. Goh, G.J. Hutchings, N. Dummer and J. Bartley, "Dependence of n-Butane Activation on Active Site of Vanadium Phosphate Catalysts" *Catalysis Letters*, **130** (2009) 327-334

- 419 N. Dimitratos, J.A. Lopez-Sanchez, D. Morgan, A.F. Carley, R. Tiruvalam, C.K. Kiely, D. Bethell and G.J. Hutchings, "Solvent-free oxidation of benzyl alcohol using Au-Pd catalysts prepared by sol immobilization" *Physical Chemistry Chemical Physics*, **11** (2009) 5142-5153
- 420 N. Dimitratos, J.A. Lopez-Sanchez, J.M. Anthonykutty, G. Brett, A.F. Carley, R.C. Tiruvalam, A.A. Herzing, C.J. Kiely, D.W. Knight and G.J. Hutchings, "Oxidation of glycerol using gold-palladium alloy-supported nanocrystals" *Physical Chemistry Chemical Physics*, **11** (2009) 4952-4961
- 421 S. Bawaked, N.F. Dummer, N. Dimitratos, D. Bethell, Q. He, C.J. Kiely and G.J. Hutchings, "Solvent-free selective epoxidation of cyclooctene using supported gold catalysts" *Green Chemistry*, **11** (2009) 1037-1044
- 422 N.N. Edwin, M. Piccinini, J.C.A. Pritchard, J.K. Edwards, A.F. Carley, J.A. Moulijn and G.J. Hutchings, "Effect of Halide and Acid Additives on the Direct Synthesis of Hydrogen Peroxide using Supported Gold-Palladium Catalysts" *ChemSusChem*, **2** (2009) 575-580
- 423 S.D. Pollington, D.I. Enache, P. Landon, S. Meenakshisundaram, N. Dimitratos, A. Wagland, G.J. Hutchings and E.H. Stitt, "Enhanced selective glycerol oxidation in multiphase structured reactors" *Catalysis Today*, **145** (2009) 169-175
- 424 N. Dimitratos, J.A. Lopez-Sanchez, S. Meenakshisundaram, J.M. Anthonykutty, G. Brett, A.F. Carley, S.H. Taylor, D.W. Knight and G.J. Hutchings, "Selective formation of lactate by oxidation of 1,2-propanediol using gold palladium alloy supported nanocrystals" *Green Chemistry*, **11** (2009) 1209-1216
- 425 A.F. Lee, S.F.J. Hackett, G. J. Hutchings, S. Lizzit, J. Naughton and K. Wilson, "In situ X-ray studies of crotyl alcohol selective oxidation over Au/Pd(111) surface alloys" *Catalysis Today*, **145** (2009) 251-257
- 426 B. Solsona, T. Garcia, G.J. Hutchings, S.H. Taylor and M. Makkee, "TAP reactor study of the deep oxidation of propane using cobalt oxide and gold-containing cobalt oxide catalysts" *Applied Catalysis A-General*, **365** (2009) 222-230
- 427 J.K. Edwards, E. Ntainjua, A.F. Carley, A.A. Herzing, C.J. Kiely and G.J. Hutchings, "Direct Synthesis of H<sub>2</sub>O<sub>2</sub> from H<sub>2</sub> and O<sub>2</sub> over Gold, Palladium, and Gold-Palladium Catalysts Supported on Acid-Pretreated TiO<sub>2</sub>" *Angewandte Chemie-International Edition*, **48** (2009) 8512-8515
- 428 P.J. Miedziak, Z.R. Tang, T.E. Davies, D.I. Enache, J.K. Bartley, A.F. Carley, A.A. Herzing, C.J. Taylor and G.J. Hutchings, "Ceria prepared using supercritical antisolvent precipitation: a green support for gold-palladium nanoparticles for the selective catalytic oxidation of alcohols" *Journal of Material Chemistry*, **19** (2009) 8619-8627
- 429 M. Sankar, N. Dimitratos, D.W. Knight, A.F. Carley, R. Tiruvalam, C.J. Kiely, D. Thomas and G.J. Hutchings, "Oxidation of Glycerol of Glycolate by using Supported Gold and Palladium Nanoparticles" *ChemSusChem*, **2** (2009) 1145-1151
- 430 S. Meenakshisundaram, E. Nowicka, P.J. Miedziak, G.L. Brett, R.L. Jenkins, N. Dimitratos, S.H. Taylor, D.W. Knight, D. Bethell and G.J. Hutchings, "Oxidation of alcohols using supported gold and gold-palladium nanoparticles" *Faraday Discussions*, **145** (2010) 341-356

## Reviews and Invited Feature Articles

1. G. J. Hutchings, 'Synthesis of hydrocarbons and alcohols from carbon monoxide hydrogenation - A review of recent literature', *S. Afr. J. Chem.*, **39** (1986) 65-74.
2. G. J. Hutchings, 'Catalysts could cut oil imports to South Africa', *New Scientist*, 3 July 1986, 35.
3. G.J. Hutchings, 'Syn-fuels from boiling stones', *Chem. Brit.*, **23** (1987) 762-766.
4. G.J. Hutchings, M.S. Scurrall and J.R. Woodhouse, 'Partial oxidation of methane using oxide catalysts', *Chem. Soc. Rev.*, **18** (1989) 251-283.
5. G.J. Hutchings and R. Hunter, 'Hydrocarbon formation from methanol and dimethyl ether: a review of the experimental observations concerning the mechanism of formation of the primary products', *Catal. Today*, **6** (1990) 279-306.
6. G.J. Hutchings and R.W. Joyner, 'Prospects for the partial oxidation of natural gas', *Chem. Ind.*, 19 August (1991) 575-578.
7. G.J. Hutchings, 'Effect of promoters and reactant concentration on the selective oxidation of n-butane to maleic anhydride using vanadium phosphorus oxide catalysts - a review', *Appl. Catal.*, **72** (1991) 1-32.
8. G.J. Hutchings, C. Nicolaidis and M.S. Scurrall, 'The synthesis of methyl tertiary butyl ether', *Catal. Today*, **15** (1992) 23-49.
9. G.J. Hutchings and M.S. Scurrall, 'Studies on the mechanism of the oxidative coupling of methane using oxide catalysts', accepted for publication in 'Direct Methane Conversion by Oxidative Processes, Fundamental and Engineering Aspects', Van Nostrand Reinhold, New York, 1992, 200-258.
10. J.P. Hindermann, G.J. Hutchings and A. Kiennemann, 'Mechanistic aspects of the formation of hydrocarbons and alcohols from CO hydrogenation', *Catal. Rev. Sci. Eng.*, **35** (1993) 1-127.
11. G.J. Hutchings, 'Catalysis in intracrystalline space', *Chem. Brit.*, **28** (1992) 1006-1009.
12. G.J. Hutchings, 'Vanadium phosphorus catalysts for the selective oxidation of n butane to maleic anhydride', *Catal. Today*, **16** (1993) 139-146.
13. C. Rhodes, G.J. Hutchings and A.M. Ward, 'Water Gas Reaction: finding the mechanistic boundary', *Catal. Today*, **23** (1995) 43-58.
14. G.J. Hutchings, J.S.J. Hargreaves, C.J. Kiely and R.W. Joyner, 'Oxide catalysts for methane oxidation: structure activity relationships' *CHEMTECH*, **24** (1994) 25-29.
15. T. Hall, J.S.J. Hargreaves, G.J. Hutchings, R.W. Joyner and S. Taylor, 'Catalytic synthesis of methanol and formaldehyde by partial oxidation of methane', *Fuel Proc. Tech.*, **42** (1995) 151-178.
16. G.J. Hutchings, 'Catalysis: A Golden Future', *Gold Bull.*, **29** (1996) 123-130.
17. G.J. Hutchings, P.C.B. Page and F. Hancock, 'Catalysts for change', *Chem. Brit.*, **33** (1997) 46-48.
18. G.J. Hutchings, G.J. Watson and D.J. Willock, 'The design of catalysts using molecular modelling', *Chem. & Ind.*, **15** (1997) 603-607.
19. G.J.K. Acres, J.C. Frost, G.A. Hards, R.J. Potter, T.R. Ralph, D. Thompsett, G.T. Burstein and G.J. Hutchings, 'Electrocatalysts for fuel cells', *Catal. Today*, **38** (1997) 393-400.
20. G.J. Hutchings, "Selective oxidation of light alkanes", *Proc. NATO Advanced Study Institute on 'Catalytic activation and functionalisation of light alkanes'* (ed. E.G. Derouane *et al.*) (1998) 125-156.
21. G.J. Hutchings, D. Bethell, N. McGuire, P.C.B. Page, D. Robinson, D.J. Willock, F. Hancock and F. King, "Heterogenous catalysts by design", *Current Topics in Catalysis*, **2** (1999) 39-58.
22. G.J. Hutchings, I.H. Stewart and E.G. Derouane "Catalytic reactions at supercritical conditions", *Current Topics in Catalysis*, **2** (1999) 17-38.
23. G.J. Hutchings, R.P.K. Wells and J.E. Bailie, "Heterogeneous catalytic hydrogenation", *Science Progress*, **82(3)** (1999) 233-250.
24. R. Shafi, and G.J. Hutchings, 'Hydrodesulphurisation of hindered dibenzothiophenes: A review', *Catal. Today*, **59** (2000) 423-442.
25. C. Rhodes, S.A. Riddell, J. West, B.P. Williams and G.J. Hutchings, 'The low temperature hydrolysis of carbonyl sulphide and carbon disulphide', *Catal. Today*, **59** (2000) 443-464.
26. G.J. Hutchings, D.J. Willock, C. Rhodes, S.H. Taylor, J.K. Bartley and R.P.K. Wells, 'Metal Oxides' in *Encyclopaedia of Heterogeneous Catalysis*, Wiley.

27. G.J. Hutchings, J.E. Bailie and S. O'Leary, 'Supported Metal Oxides' in Encyclopaedia of Materials, Wiley, (2002) 8986-8991.
28. Graham J. Hutchings and Michael S. Scurrall 'Designing Oxidation Catalysts: Are we getting better?', *CATTECH*, **7**(3) (2003) 90-103.
29. G.J. Hutchings, 'New approaches to rate enhancement in heterogeneous catalysis', *Chem. Commun.*, Invited Feature Article (1999) 301-306.
30. G.J. Hutchings, 'Promotion in Heterogeneous Catalysis : A topic requiring a new approach', *Catal Lett.*, **75** (2001) 1-12.
31. G.J. Hutchings and J.C. Vedrine, 'Catalyst Preparation' *Preparation Functionality and Characterisation of Heterogeneous Catalysts* Basic Principles in Applied Catalysis (M. Baerns, ed.) Springer (2003) 215-258.
32. G.J. Hutchings, 'Catalysts: Golden opportunities' *TCE.*, (March, 2004) 34-36.
33. G.J. Hutchings, "New directions in gold catalysis" *Gold Bull.* **37** (2004) 3-11.
34. P. McMorn and G.J. Hutchings, 'Heterogeneous enantioselective catalyst: strategies for the immobilisation of heterogeneous catalysts' *Chem. Soc. Rev.*, **33** (2004) 108-122.
35. G.J. Hutchings, "Vanadium phosphate: A new look at the active components of catalysts for the oxidation of butane to maleic anhydride" *J. Mater. Chem.* **14** (2004) 3385-3395.
36. G.J. Hutchings, "Catalysis by gold" *Cat. Today* **100** (2005) 55-61.
37. G.J. Hutchings and M. Haruta, "A golden age of catalysis: a perspective" *Appl. Catal., A*: **291** (2005) 2-5.
38. G.J. Hutchings, "Heterogeneous asymmetric catalysts: Strategies for achieving high enantioselection" *Ann. Rev. Mat. Res.* **35** (2005) 143-166.
39. C.J. Kiely CJ and G.J. Hutchings "Adventures with vanadium phosphate catalysts: Reflections on a long standing collaboration with J.C. Volta, *Appl. Catal. A*, **325** (2007) 194-197.
40. A.S.K. Hashmi and G.J. Hutchings "Gold Catalysis", *Angew. Chem., Int. Ed.*, **45** (2006) 7896-7936.
41. G.J. Hutchings, "A golden future for green chemistry" *Catal. Today*, **122** (2007) 196-200.
42. J. K Edwards and G. J. Hutchings, "Palladium and Gold-Palladium Catalysts for the Direct Synthesis of Hydrogen Peroxide" *Angewandte Chemie-International Edition*, **47** (2008) 9192-9198
43. G. J. Hutchings, M. Brust and H. Schmidbaur, "The wonder of gold" *Energy & Environmental Science*, **1** (2008) T71-T71.
44. G. J. Hutchings, "Heterogeneous catalysts-discovery and design" *Journal of Materials Chemistry*, **19** (2009) 1222-1235
45. C.L. Bracey, P.R. Ellis and G.J. Hutchings, "Application of copper-gold alloys in catalysis: current status and future perspectives" *Chemical Society Reviews*, **38** (2009) 2231-2243
46. G.J. Hutchings, "Nanocrystalline gold catalysts: A reflection on catalyst discovery and the nature of active sites" *Gold Bulletin*, **42** (2009) 260-266

## Monographs and Books

1. G.J. Hutchings and M.S. Scurrall (Editors) 'Synfuels', *Catal. Today*, Vol. 6, Part 2, 1990.
2. G.J. Hutchings and M.S. Scurrall (Editors) 'C<sub>1</sub> conversion, New Technology', *Catal. Today*, Vol. 8, Part 3, 1991.
3. G.J. Hutchings and M.S. Scurrall (Editors) 'Fuel additives and extenders', *Catal. Today*, Vol. 15, Part 1, 1992.
4. G.J. Hutchings and M.S. Scurrall (Editors) 'Fuels and Feedstocks: The Next Generation of Catalysts and Processes', *Catal. Today*, Vol. 18 Part 4, 1993.
5. G.J. Hutchings and M.S. Scurrall (Editors) 'Recent Advances in C<sub>1</sub> Chemistry', *Catal. Today*, Vol 23 Part 4, 1995.
6. G.J. Hutchings and T. Burstein (Editors), 'Catalysis and Fuel Cells', *Catal. Today*, Vol. 38, Part 4, 1997.
7. G.J. Hutchings and C. Mirodatos (Editors), 'Cross Linked European Research on the Oxidation of Light Hydrocarbons', *Catal. Today*, Vol. 40, Parts 2-3, 1998.

8. G.J. Hutchings and G. Busca (Editors), 'Environmental Catalysis in Europe', *Catal. Today*, Vol. 59, parts 3-4, 2000.
9. G.J. Hutchings, D.J. Willock and J.M. Thomas, 'Reflections on asymmetric catalysis' *Topics Catal.*, Vol. 25 (2003).
10. G.J. Hutchings and E.G. Derouane, 'Oxidation Catalysis' *J. Molec. Catal. A*, vol 220 (2004).
11. G.J. Hutchings and M. Haruta, 'Catalysis by gold', *Appl. Catal.*, vol 291 (2005).
12. C.T. O'Connor, K.P. Moeller, J. Weitkamp and G.J. Hutchings, "Proceedings of the Pre-Conference School of the 14th International Zeolite Conference held 23-24 April 2004 in Cape Town, South Africa Microporous Mesoporous Mater. **82** (2005) part 3.
13. G.J. Hutchings and W. Goodman, "Catalysis by Gold", *Topics Catal.*, vol 44 (2007).