

Support Effects on Ethanol Oxidation at Pt Nanoparticles

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Support effects on the oxidation of organic fuels at Pt and Pd nanoparticles are well known, with various metal oxides and conducting polymers showing significant effects [1]. Although these have been investigated most widely for methanol oxidation, they are potentially much more important for ethanol oxidation where the other main means of enhancing activity (alloying and surface modification) increase the formation of partially reduced products (acetaldehyde and acetic acid) [2].

Ru and Sn containing oxide supports have been shown to enhance the activity of Pt for ethanol oxidation [3]. Ru oxide appears to promote the reaction through a bifunctional mechanism, while electronic effects are implicated for Sn oxide and mixed oxides containing Sn.

These results will be reviewed and new results for Pt on carbon black supported RuSn oxide presented. These new catalysts have been evaluated in a direct ethanol fuel cell, with monitoring of the CO₂ produced using a non-dispersive infrared CO₂ detector. Cell performances and yields of carbon dioxide (complete oxidation of ethanol) will be compared with those for unsupported Pt. The effects of cell operation parameters on CO₂ yields will also be discussed.

References

1. E. Antolini, *App. Catal. B Environ.*, 2010, **100**, 413.
2. S. Rousseau, C. Coutanceau, C. Lamy, J.M. Leger, J. Power Sources, 2006, **158**, 18.
3. R. B. Moghaddam and P. G. Pickup, *Electrochim. Acta*, 2012, **65**, 210.