

Methane oxidation using gold-containing nanoparticles

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Catalysis is of crucial importance for the manufacture of the goods and infrastructure necessary for the effective wellbeing of society. Catalysis, and in particular selective redox catalysis, continues to play a key role in the manufacture of chemical intermediates and there is a continuing requirement to design new effective redox catalysts. The identification that gold in nanoparticulate form is an exceptionally effective redox catalyst has paved the way for a new class of active catalysts. Indeed, gold is the most active catalyst for the oxidation of carbon monoxide at ambient temperature. It is also the most effective catalyst for the synthesis of vinyl chloride by acetylene hydrochlorination and gold has recently been commercialized in China for this reaction. We have recently found that gold-containing nanoparticles can be very active for methane oxidation to methanol.¹ The synthesis of active catalysts will be described as well as their characterization. Aspects of the latest research on these topics will be presented.

1. N. Agarwal, S.J. Freakley, R.U. McVicker, S.M. Althahban, N. Dimitratos, Q. He, D.J. Morgan, R.L. Jenkins, D.J. Willock, S.H. Taylor, C.J. Kiely and G.J. Hutchings “Aqueous Au-Pd colloids catalyse selective CH₄ oxidation to CH₃OH with O₂ under mild conditions” *Science*, **358** (2017) 223-226.