



## Multimetallic Catalysis for Efficient Heterocycle Synthesis: From Homogeneous to Supported Catalysts

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### Abstract

Transition metal catalysts can be used to promote the highly efficient synthesis of heterocycles. We have shown that Rh(I) and Ir(I) complexes containing *N,N* donor ligands are effective catalysts for the hydroamination reaction, as well as tandem reactions such as dihydroalkoxylation. In particular, we have shown that bimetallic *bispyrazolyl*-methane complexes of Ir(I) and/or Rh(I) are significantly more efficient catalysts than their monometallic counterparts and that the two metal centres work cooperatively to promote both one and two step reactions. We have also made very significant improvements to the intermetallic cooperativity of the bimetallic systems using a novel series of Rh(I) complexes that are geometrically constrained such that the bimetallic complexes allow close approach of the two metal centres and enhanced bimetallic cooperativity. The covalent immobilisation of transition metal catalysts on solid supports offers the possibility of combining the significant advantages of homogeneous catalysis with the benefits of heterogeneous catalysts. We have also immobilized a series of Rh(I) complexes bearing *N,N* and *N,P* donor ligands on glassy carbon surfaces with robust C-C linkers. The immobilized complexes achieved significantly higher turnover numbers than those of their homogeneous counterparts.

### Profile

Research in Barbara Messerle's group involves organometallic synthesis, catalysis, computational molecular modelling and advanced NMR Spectroscopy. Their overall goal is to create highly active catalysts that promote atom-efficient organic transformations. They target key organic transformations that can simultaneously expedite the preparation of high value fine chemicals and at the same time reduce energy consumption and waste. They are particularly interested in the synthesis of heterocycles and the development of tandem reactions that facilitate multiple chemical transformations in the same flask.

She received her PhD from University of Sydney 1987 and worked as a postdoctoral fellow at ETH Zürich, Switzerland. This was followed by appointments as Gritton Research Fellow, ARC Queen Elizabeth II Fellow and ARC Senior Research Fellow at the University of Sydney. In 1999 she was appointed as ARC Senior Research Fellow followed by Senior Lecturer, Associate Professor and then full Professor at the University of New South Wales.

**Staff and students at all levels are welcome to attend.**

### Venue and Time:

This talk will be held on 6<sup>th</sup> August 2014 at 2:00pm at the Campbelltown Campus in Building 30, (CA-30.G.213).

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