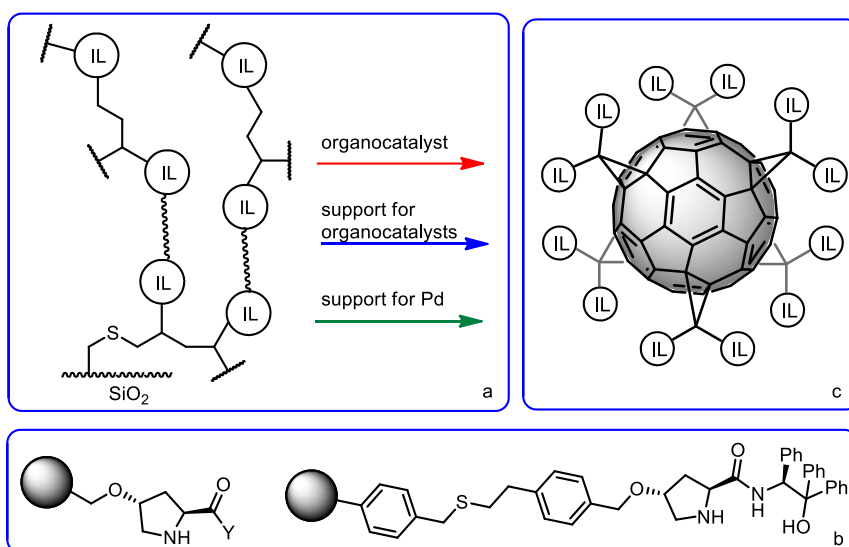


Organocatalysts and metal-based catalysts: a journey toward the development of new catalytic materials

Michelangelo Gruttadauria

*Department of Biological, Chemical and Pharmaceutical Sciences and Technologies
University of Palermo - Viale delle Scienze s/n Ed. 17, 90128 Palermo, Italy.
e-mail: michelangelo.gruttadauria@unipa.it*

Organocatalysis and metal-based catalysis represent two of the main pillars of catalytic reactions and have witnessed a huge interest in the last decade. Immobilization, recovery and reuse of these catalysts is of primary importance because of the large amount used especially in the case of organocatalysts. On the other hand, metal-based catalysts must be recovered even if used in low amount, in order to avoid contamination of the product. In this context, we started several years ago investigations on the use of supported ionic liquid phases for the asymmetric organocatalysis mediated by proline.¹ This approach is an example of a “release and catch” catalytic system.² Starting from this example, we describe the development of new catalytic materials based on the use of *i*) supported ionic liquid phase (Scheme 1a) *ii*) covalently linked catalysts (scheme 1b) *iii*) ionic liquid-modified fullerenes (Scheme 1c), with the goal to obtain recyclable catalytic materials for C-C coupling reactions and alcohols oxidation.³ These studies have paved the way for the development of new hybrid materials such as silica-fullerenes or CNT-IL or POSS-IL.



Scheme 1

- 1) Gruttadauria, M.; Riela, S.; Lo Meo, P.; D'Anna, F.; Noto, R. *Tetrahedron Lett.*, **2004**, *45*, 6113; Gruttadauria, M.; Riela, S.; Aprile, C.; Lo Meo, P.; D'Anna, F.; Noto, R. *Adv. Synth. Catal.*, **2006**, *348*, 82.
- 2) Gruttadauria, M.; Giacalone, F.; Noto, R. *Green Chem*, **2013**, *15*, 2608-2618.
- 3) Recent examples: Campisciano, V.; La Parola, V.; Liotta, L.F.; Giacalone, F.; Gruttadauria, M. *Chem. Eur. J.* **2015**, *21*, 3327-3334; Beejapur, H.A.; Campisciano, V.; Giacalone, F.; Gruttadauria, M. *Adv. Synth. Catal.* **2015**, *357*, 51-58.