doi:10.2533/chimia.2011.475 Chimia 65 (2011) 475–475

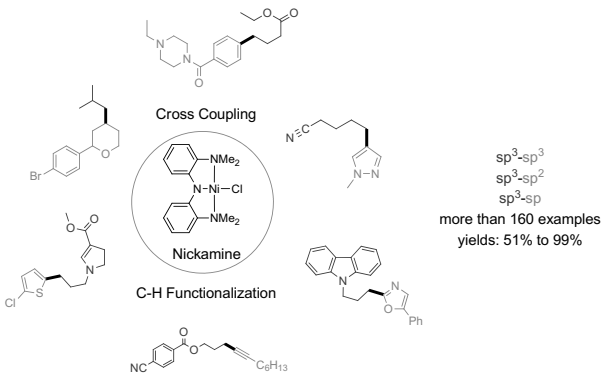
Inorganic and Coordination Chemistry **P 1**

Ni-catalyzed cross coupling of alkyl halides and direct C-H alkylation

Xile Hu

Institute of Chemical Sciences and Engineering, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, CH 1015.

Non-activated alkyl halides are challenging substrates for cross coupling reactions because they are resistant to oxidative addition and because metal alkyl intermediate species are prone to β-H elimination. Despite of recent progress in this area, the scope and utility of coupling reactions of alkyl halides are under-developed. We have prepared well-defined Ni catalysts that catalyze efficiently the coupling of non-activated alkyl halides with alkyl, aryl, and heteroaryl Grignard reagents. We have also explored the coupling between alkyl halides and C—H bonds using the same Ni catalysts. An important feature of this catalysis is its high functional group compatibility, as illustrated in hundreds of examples. Groups such as keto, ester, amide, nitrile, indole, carbozole, ether, thioether, furan, acetal, aryl-halide, etc. are well tolerated.



Physical Chemistry **P 2**

Molecular rotors measure intracellular viscosity: a story with a twist

Marina K Kuimova

Department of Chemistry, Imperial College London, Exhibition Road, SW7 2AZ, UK

Viscosity is one of the main factors which influence diffusion in condensed media. In a cell viscosity can play a role in several diffusion mediated processes, such as drug delivery, signalling and mass transport. Previously, alterations in viscosity in cells and organs have been linked to malfunction; however, mapping viscosity on a single-cell scale remains a challenge.

We have imaged viscosity inside individual cells using fluorescent probes, called molecular rotors, in which the speed of rotation about a sterically hindered bond is viscosity-dependent [1-3]. This approach enabled us to demonstrate that viscosity distribution in a cell is highly heterogeneous and that the local microviscosity in hydrophobic cell domains can be up to 100× higher than that of water. These conclusions have been confirmed by monitoring the decay and reaction rates of short-lived excited state of molecular oxygen, singlet oxygen, $O_2(a^1\Delta_g)$, on a single cell level [4].

We have also shown that the intracellular viscosity increases dramatically during light activated cancer treatment, called Photodynamic therapy (PDT) [2]. We have demonstrated the effect of such viscosity increase on intracellular reactions by directly monitoring dynamic changes in the rates of formation and decay of a short lived toxic intermediate, crucial in PDT, singlet molecular oxygen, $O_2(a^1\Delta_g)$, in light perturbed cells [2] and under conditions of controlled singlet oxygen production in viscous medium [5].

[1]. M. K. Kuimova, *et al J. Amer. Chem. Soc*., **2008**, *130*, 6672
[2]. M. K. Kuimova, *et al*, *Nature Chem.*, **2009**, *1*, 69
[3]. J. A. Levitt, *et al J. Phys. Chem. C*, **2009**, *113*, 11634
[4]. M. K. Kuimova, *et al*, *J. Amer. Chem. Soc*., **2009**, *131*, 332
[5]. M. K. Kuimova, *et al*, *J. Amer. Chem. Soc*., **2009**, *131*, 7948