Well-Defined Core-shell Functionalized Polymers as Nanoreactors for Biphasic Catalysis

Eric Manoury

LCC-CNRS, 205 Route de Narbonne, 31077 Toulouse Cedex 4, FRANCE
eric.manoury@lcc-toulouse.fr

Catalyst recovery and recycling is one very important aspect of the application of catalytic technology, with a strong impact on energy efficiency, industrial economy, and the environment (waste production). We will present a new approach for efficient biphasic catalysis using water to confine the catalyst, based on the catalyst covalent linking to the hydrophobic core of well-defined amphiphilic nanosized core-shell polymers. These polymers (see figure 1) have been efficiently synthesized by RAFT polymerization in aqueous dispersion. The core-shell functionalized polymers were efficiently used in the rhodium-catalyzed hydroformylation of 1-octene under aqueous biphasic conditions The catalyst could be recycled several times by simple decantation with low Rh leaching.[1]

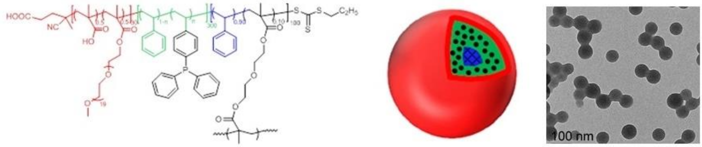

Figure 1 (Left) Structure of 1st generation nanoreactors; (Right) TEM images of nanoreactors

Coordination chemistry and interparticle metal migration studies involving the swollen hydrophobic cores[2] have allowed us to formulate hypotheses on the mass transport mechanisms and of rhodium leaching to the organic phase. The first results in the hydrogenation of alkenes under aqueous biphasic conditions using the same nanoreactors will be also presented.[3]

The first results on the optimization of the nanoreactor's cores and shells will be presented. [4]

Keywords: biphasic catalysis, nanoreactors, coordination chemistry, rhodium, hydroformylation, hydrogenation

References

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