

Dendrimer Templates for Supported Catalysts

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Although supported nanoparticle catalysts are readily prepared by standard impregnation techniques, active sites are not necessarily well characterized or well understood. Our work is directed towards preparing supported catalysts from nanoparticles prepared using new solution synthetic techniques. Polyamidoamine (PAMAM) dendrimers offer a new means of templating finely dispersed (1.3 ± 0.3 nm) mono- and bimetallic nanoparticles in solution. Bimetallic particle compositions unavailable through traditional syntheses can be prepared, and in some cases it is possible to control particle morphologies (e.g. core-shell vs. well-mixed nanoparticles).

The seminar will discuss developing synthetic methodologies for the preparation of bimetallic metal nanoparticles, particularly preparative schemes directed towards preparing materials that are appropriate precursors for heterogeneous catalysts. Methods for depositing solution phase nanoparticles onto commercial oxide supports and subsequently removing the nanoparticle stabilizers will be evaluated. The resulting catalysts are appropriate models for traditionally prepared catalysts, and can be used investigate new bimetallic catalysts that cannot be prepared via traditional catalyst preparation techniques. Recent work with Au/TiO₂ low temperature CO oxidation catalysts will be highlighted as example of the available synthetic techniques and their application to catalyst investigation.

