

588e Single-Step Synthesis of Gold/Porous Silica Nanocomposite Materials

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Gold-porous silica nanocomposite materials have been formed in microemulsions by simultaneous hydrolysis/condensation of a silica precursor along with reduction of the gold precursor. Striking the right balance between these simultaneous reactions is the key to succeed in synthesis of well-dispersed gold nanoparticles within the porous silica matrix. The microemulsion is formed using Iso-octane/AOT (Sodium bis (2-ethylhexyl) sulfosuccinate)/Lecithin/TEOS (Tetraethyl orthosilicate) /HAuCl₄ (Auric Chloride)/NaBH₄ (Sodium borohydride). This system is chosen because of its ability to manipulate the underlying viscosity of the precursor phase, helping to immobilize the particles once they are produced. Changing the aqueous content as well as the auric chloride concentration has a distinct effect on the morphology and size of the resulting gold particles, as well as their dispersion in the porous silica matrix. Additional experiments where hydrophobically modified gold nanoparticles are formed in a single step in situ experiment are described. These experiments provide an interesting pathway for the formation of catalyst-support composite materials.