

A simple approach for fabricating yolk structure of Au/hollow mesoporous silica nanoparticles

송영건, 장호찬, 이강택^{1,†}

연세대학교; ¹연세대학교 화공생명공학과

(kilee@yonsei.ac.kr[†])

We present a simple route to prepare mesoporous hollow silica particles containing a Au core, i.e., yolk/shell particles, by a sol-gel and selective etching processes. Using tetraethoxysilane as a silica precursor, zinc acetate as a base catalyst, and cetyltrimethylammonium chloride as a soft template in the presence of Au nanoparticles, double-layered mesoporous shells were produced in one step. Elemental analysis showed that the inner shell consists of zinc silicate and the outer shell is pure silica. Au/mesoporous silica yolk/shell nanoparticles were obtained by selective etching of the zinc oxide phase with citrate buffer. The particle structure and composition were studied by transmission electron microscopy with energy disperse spectroscopy, UV-vis spectroscopy, X-ray diffraction, and nitrogen sorption experiments. Formation of double shells on the Au core in a single step was explained by a difference in the formation rates of the silica and zinc silicate phases. Au/mesoporous yolk/shell particles showed a high catalytic activity for reduction of 4-nitrophenol.