

Ag and Au Nanoparticles Fabrication in Cross-Linked Polymer Microgels for Their Comparative Catalytic Study

Authors : Luqman Ali Shah, Murtaza Sayed, Mohammad Siddiq

Abstract : Three-dimensional cross-linked polymer microgels with temperature responsive N-isopropyl acrylamide (NIPAM) and pH-sensitive methacrylic acid (MAA) were successfully synthesized by free radical emulsion polymerization with different amount of MAA. Silver and gold nanoparticles with size of 6.5 and 3.5 nm (± 0.5 nm) respectively were homogeneously reduced inside these materials by chemical reduction method at pH 2.78 and 8.36 for the preparation of hybrid materials. The samples were characterized by FTIR, DLS and TEM techniques. The catalytic activity of the hybrid materials was investigated for the reduction of 4-nitrophenol (4- NP) using NaBH₄ as reducing agent by UV-visible spectroscopy. The hybrid polymer network synthesized at pH 8.36 shows enhanced catalytic efficiency compared to catalysts synthesized at pH 2.78. In this study, it has been explored that catalyst activity strongly depends on amount of MAA, synthesis pH and type of metal nanoparticles entrapped.

Keywords : cross-linked polymer microgels, free radical polymerization, metal nanoparticles, catalytic activity, comparative study

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