

# **A facile one-step synthesis of noble metal nanoparticles in DMSO using poly(ethylene glycol)-poly(epsilon-caprolactone) block copolymers**

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## **Abstract**

Herein, we report the synthesis and characterization of Au and Ag nanoparticles prepared by direct reaction between poly(ethylene glycol)-poly( $\epsilon$ -caprolactone) (PEG-PCL) block copolymers and metal precursors in DMSO at 343 K. Special attention is devoted to the structural and molecular weight effects on nanoparticle synthesis to establish general correlations between the experimental parameters and the characteristics of the obtained nanoparticles. The noble metal nanoparticles were characterized by transmission electronic microscopy (TEM), dynamic light scattering (DLS), UV-visible spectroscopy, zeta potential (ZP) and FT-IR techniques. The shape and size of the obtained nanoparticles primarily depend mainly on the chemical structure and composition (PEG-PCL) of the copolymers used in the synthesis. From density functional theory (DFT), the chemical groups responsible for metal salt reduction and stabilization of the nanoparticles have been represented using simple models. The possible solvent effects were also considered by incorporation of a polarizable continuum model (PCM) into the calculations.