

Fullerene mediated electrosynthesis of Au/C₆₀nanocomposite

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Abstract

© 2017 The Electrochemical Society. All rights reserved. C₆₀ fullerene mediated electroreduction of Au(I) at potentials of the C₆₀/C₆₀^{•-} redox couple was used to perform the electrosynthesis of an AuNP/C₆₀ nanocomposite in DCB-DMF (2:1)/0.1 M Bu₄NCl medium. The nanocomposite consists of separate gold nanoparticles with various shapes and a mean size of $\sim 27 \pm 14$ nm, as well as larger nanoaggregates of such particles, isolated in a fullerene matrix. The mean size of metal crystallites is 9–14 nm. The electrolysis occurs efficiently, and Au(I) is quantitatively reduced to Au(0) upon consumption of the theoretical amount of electricity. The resulting metal nanoparticles and the nanocomposite are not deposited on the electrode and are completely stabilized in the solution bulk. All the particles were characterized by electron microscopy methods (SEM, HR TEM) and X-ray powder diffraction (XRPD).

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