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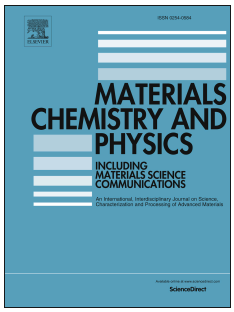

Microwave-assisted synthesis of single-walled carbon nanotube-supported ruthenium nanoparticles for the catalytic degradation of Congo red dye

Tirandai Hemraj-Benny, Nelson Tobar, Nicholas Carrero, Rawlric Sumner, Leandro Pimentel, Gariele Emeran

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Microwave-Assisted Synthesis of Single-Walled Carbon Nanotube-Supported Ruthenium Nanoparticles for the Catalytic Degradation of Congo red Dye

Tirandai Hemraj-Benny[a]*, Nelson Tobar[a], Nicholas Carrero[a], Rawlric Sumner[a], and Leandro Pimentel[a], Gariele Emeran[a]

[a] Queensborough Community College, Department of Chemistry, S-443, 222-05 56th Avenue, Bayside, NY, 11364.

*Corresponding Author: Queensborough Community College, Department of Chemistry, S-443, 222-05 56th Avenue, Bayside, NY, 11364. Tel: 718-281-5494. Email: themrajbenny@qcc.cuny.edu

In this article, we describe a rapid, convenient, one-pot microwave method to synthesize Ru nanoparticles supported onto un-functionalized single-walled carbon nanotubes (SWNTs). Depending on the reaction temperature, small ruthenium nanoparticles, of 2.0 ± 0.5 nm or 3.5 ± 0.5 nm, were evenly distributed and stabilized onto SWNTs support without agglomeration. The structural integrity of the carbon nanotube was maintained upon microwave irradiation. The structural morphology of the SWNT-Ru nanoparticle composites was analyzed by high-resolution transmission electron microscopy (HR-TEM), UV-Visible spectroscopy and Raman spectroscopy. The SWNT-Ru nanoparticle composites demonstrated excellent catalytic properties in the decolorization and the degradation of Congo red dye within minutes at ambient temperature and without additional perturbation. The support of the SWNTs played a critical role not only in the synthesis of the non-agglomerated Ru nanoparticles but also in the efficient degradation of the Congo red dye. In addition, the effective recoverability and reusability of the catalyst establish its potential for practical catalytic applications.