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Effect of γ-Irradiation on Ruthenium-Morin Nanocomposite for Trace Detection of Ce(IV), Ce(III) and Dy(III)

Pritam Singh[1]*, Zarina Ansari[1], Santanu Ray[2], Bilwadal Bandyopadhyay[3] and Kamalika Sen[1]
[1]University of Calcutta, India
[2]University of Brighton, UK
[3]CMP Division, Saha Institute of Nuclear Physics, India

The article reports on the generation of Ru-morin nanocomposites using a simple methodology in presence and in absence of γ-irradiation. The nanocomposites were characterized using several techniques including, N2 adsorption-desorption, Brunauer–Emmett–Teller (BET) method, transmission electron microscopy (TEM), Fourier transform infra-red (FTIR) spectroscopy, powder X-ray diffractometric (XRD) technique, dynamic light scattering (DLS) and X-ray photoelectron spectroscopic (XPS) methods. The results revealed the production of comparatively smaller sized particles with smaller pores when prepared in presence of energetic γ-irradiation. The irradiated nanocomposite was found to be an eligible candidate for analytical sensing of Ce(IV), Ce(III) and Dy(III) out of a set of different lanthanoids. The lowest values of limit of detection (LOD) out of all the pH conditions for Ce(IV), Ce(III) and Dy(III) were 0.09 μM (at pH 12), 0.08 μM (at pH 12) and 5.37 μM (at pH 2) respectively using absorption spectroscopy. The LOD of Ce(IV) at pH 7 was found to be 0.35 μM by fluorescence spectroscopic method. It is established that the sensing is a pH dependent phenomenon which enables a selective and mutually exclusive sensing of these three lanthanoids individually.

Biography:

Pritam Singh received his Bachelors and Masters degree in Chemistry from University of Calcutta in the year of 2014 and 2016 respectively. Currently, he is working as a Ph. D scholar at University of Calcutta under UGC, NET-JRF scheme as senior research fellow. His main area of research is in the field of designing porous materials for the application in solving different industrial and environmental issues. He has four international publications in this field. He has also received a best poster presentation award in an International conference organized by the Indian Chemical Society.