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Electrospinning of polyacrylonitrile nanofibers embedded with zero-valent iron and cerium oxide nanoparticles, as Cr (VI) adsorbents for water treatment

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Abstract

Zero-valent iron (ZVI) and cerium oxide (CeO2) nanoparticles (NPs) embedded in polyacrylonitrile nanofibers (NFs) were obtained via electrospinning. Each NF was characterized using Fourier transform infrared spectroscopy and X-ray diffraction. The scaffold morphology and average diameter of the NFs were determined using scanning electron microscopy (SEM). Energy dispersive X-ray spectroscopy (EDS) mapping and Raman spectroscopy were used to characterize the NPs dispersion in the NFs. The Cr (VI) removal efficiency (%E) of ZVI and CeO2 NPs was compared with the efficiency of their corresponding NFs. CeO2 NPs showed 79% Cr(VI) removal; the efficiency was better for their NFs (96%). Regeneration of ZVI NFs was 98 %E. ZVI NPs were the best adsorbent with 99.9% efficiency. An adsorption mechanism was proposed using Langmuir, Freundlich, and Temkin isotherm models. SEM–EDS analyses revealed that Cr adsorbed on the NP and NF surfaces.

Biography

Edna Vazquez has completed her Ph.D. at the age of 25 years from Puebla University, Mexico. She worked at postdoctoral research position in Centre National de la Recherche Scientifique, at Yves Sur Yvette France. She is the research in the Institute of Sciences Physics from the National Autonomous University of Mexico (UNAM). She has 20 publications that have been cited over 165 times, and his/her publication H-index is 10 and has been a reviewer of reputed Journals.

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