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September 7, 2022, 4:16PM

All: **Preparation and Characterization of Antibacterial Copper Doped Activated Carbon from Coconut Coir and its Application in Removal of Hardness and Fluoride in Drinking Water**

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Preparation and characterization of antibacterial copper doped activated carbon from coconut coir and its application in removal of hardness and fluoride in drinking water

By: Madhusha, Chamalki; Jayasundara, Thushani; Munaweera, Imalka; Perera, Chandani; Wijesinghe, Gayan; Weerasekera, Manjula; Sandaruwan, Chanaka; Kottegoda, Nilwala

Activated Carbon (AC) is a promising material that can effect ively purify and enhance the quality of drinking water. Metal doped A C nanohybrids have received a high scientific interest due to their synerg istic effect on both metal dopant and the activated carbon material. In this study, Copper nanoparticles doped activated carbon (Cu-ACC) is synthesized from coconut coir by a novel in- situ chem. reduction method. The successful formation of zero-valent Cu nanoparticles in the Cu-ACC nanohybrid was confirmed using the phase anal. in Powder X-ray Diffra ction. Further, the Cu 2p peak in X- ray Photoelectron Spectrum (XPS) of the Cu-ACC composite shows a sharp doublet at 932.7 eV (Cu $2p_3/_2$) and 952.9 eV (Cu $2p_1/_2$) and there were no shakeup satellite peaks for Cu O. The presence of 873 cm^{-1} peak in the Fourier Transform I R Spectrum corresp onding to the vibrational frequency of Cu-O bond also confirms the successful impregnation of Cu in the Cu-ACC. The S EM imaging/E DX confirms the porous nature of Cu-ACC and the presence of Cu in the sample. The high-resolution Transmission Electron Microscopy anal. further confirms the at. interaction with carbon and the A C matrix. The prepared Cu-ACC was tested for the removal of hardness and fluoride in drinking water under both static and dynamic condit ions. There was a significant improvement in hardness (65%, 1000 ppm initial) and fluoride (60%, 2 ppm initial) removal under dynamic conditions with the usage of 100 mg dosage of Cu-ACC. The resulting Cu-ACC further demonstrates an enhanced antimicrobial activity against three commonly found water pathogens; Escherichia coli, Salmonella typhi, and Shigella flexneri. Thus, the prepared Cu- ACC nanohybrids with antimicrobial properties can be used as a multi- functioning nanomaterial for the treatment of drinking water.

Conference

Source
Abstracts of Papers, 262nd ACS National Meeting & Exposition, Atlanta, GA, United States, August 22-26, 2021
Pages: No pp. given
Conference; Article
2021
CODEN: 69SAAP
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Publisher
American Chemical Society
Language
English