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Extraction of toxic and valuable metal ions from used batteries and water-borne microbes from contaminated water using the multifunctional nano composites

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Multifunctional high surface area, superparamagnetic, hierarchically ordered porous crystalline nanocomposites have not been successfully synthesized for the extraction and purification of valuable and toxic metal ions from waste batteries or battery contaminated water. Our group has developed several hierarchically ordered porous nanocomposites for catalysis however such structure with crystalline walls have not been reported earlier for the application in water decontamination or purification. Herein the author will report a series of such novel nanocomposites using the nanocrystalline zeolites as building blocks, embodied with polystyrene spheres as a template to form hierarchically ordered porous structure by two different synthesis methods such as (i) hydrothermal and (ii) microwave. The synthesised nanocomposites have been extensively characterized using various analytical techniques. The crystalline microporous nature of nanocomposites pore walls has been verified using Powder X-ray Diffraction (XRD) and measuring BET surface area by nitrogen gas adsorption, whereas the macroporous nature of hierarchical structures have been verified using Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM) and mercury porosimetry. The enhanced surface area, superparamagnetic properties and hierarchically ordered porous structure enables these materials as a powerful filtration kit for the purification of toxic metal ions from battery contaminated water and further application for the removal of water-borne microbes from contaminated water. The materials can be separated by single step magnetic separation for re-usability.

Biography

Amritvir Kaur is currently pursuing her PhD at the University of Central Lancashire, Preston, England. She has completed her Bachelor's degree in Chemical Sciences from University of California, Merced, USA. Her present study focuses on purification methods with respect to extraction of toxic & valuable metal ions from battery electrolytes and water-borne microbes from contaminated water.

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