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ZnO nano grafted chitin–chitosan based hybrid composite coated super hydrophobic filter paper for water flow cleaning and oil–water separation applications

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Abstract

A robust superhydrophobic filter paper was developed through a coating technique, simple and facile, cost-effective, eco-friendly, and defensible, for wide portfolio applications. To develop super hydrophobic filter papers, the paper was coated with inorganic–organic hybrid nanocomposites comprising zinc oxide, chitin, and polycaprolactone (chitin–ZnO–PCL) and zinc oxide, chitosan, and polycaprolactone (chitosan–ZnO–PCL) hybrids through the grafting method. The preparation of a superhydrophobic surface by dip-coating deposition is a facile process. Zinc oxide nanoparticles grafted with chitin–PCL and chitosan–PCL hybrids coated on paper exhibit superhydrophobic properties. Water contact angle measurement carried out using a goniometer showed the average static water angle values of 145° and 160° for the chitin–ZnO–PCL and chitosan–ZnO–PCL grafted hybrid coated surfaces, respectively. The surface morphology of the coating was studied using scanning electron microscopy, X-ray powder diffraction, UV radiation, and Fourier transform infrared spectroscopy. In addition, durability, oil/water separation, bio-degradability, and self-cleaning ability through water flush-out were also studied and reported. The results show that the coated filter papers possess excellent superhydrophobic properties for real-time applications.

