

Nanostructure Formation and Characterization of Eco-Friendly Banana Peels Nanosorbent

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Abstract : Nanostructure formation and characterization of eco-friendly banana peels nanosorbent are thoroughly described in this paper. The transformation of material during mechanical milling to enhance certain properties such as changes in microstructure and surface area to solve the current problems involving water pollution and water quality were studied. The mechanical milling was employed using planetary continuous milling machine and ethanol as process control agent, the sample were taken at time interval between 10 h to 30 h to examine the structural changes. The samples were characterised by X-ray diffraction (XRD), scanning electron microscopy (SEM), Fourier transform infra-red (FTIR), Transmission electron microscopy (TEM) and Brunauer Emmett and teller (BET). Results revealed that the three typical structures with different grain-size, lattice strain and shapes were observed, and the deformation mechanisms in these structures were found to be different, further particles fracturing results to surface area increment which was confirmed by Brunauer Emmett and teller (BET) analysis. X-ray diffraction (XRD) shows high densities of dislocations in large crystallites, implying that dislocation slip is the dominant deformation mechanism. Scanning electron microscopy revealed the morphological properties of the materials at different milling time, nanostructure of the particles and fibres were confirmed by Transmission electron microscopy and FT-IR identified the functional groups responsible for its capacity to coordinate and remove metal ions, such as the carboxylic and amine groups at absorption bands of 1730 and 889 cm^{-1} , respectively. However, the choice of this sorbent material for the sorption of any contaminants will depend on the composition of the effluent to be treated.

Keywords : banana peels, eco-friendly, mechanical milling, nanosorbent, nanostructure water quality

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