

IN SITU ONE STEP SYNTHESIS OF CALCITE AND VATERITE SUPER-HYDROPHOBIC PRECIPITATED CALCIUM CARBONATE NANO PARTICLES FROM SRI LANKAN DOLOMITE

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Development of value-added products from natural minerals increases their economic potential. Fabrication of bio inspired super-hydrophobic nanoparticles mimicking lotus leaf effect is such a way to add value to local dolomite. Moreover the self-cleaning ability of super-hydrophobic surfaces is an added advantage. In this study, super-hydrophobic precipitated calcium carbonate nanoparticles were successfully synthesized from Sri Lankan dolomite. The synthesis was performed using anionic surfactant sodium dodecyl sulphate (SDS) and salt of stearic acid (SA). Concentrations of surfactants were controlled slightly above their critical micelle concentration (CMC) to form micelles around the Precipitated Calcium Carbonate (PCC) nanoparticles at a pH between 7 and 8. Particle aggregation was compared for products obtained by hydrothermal process and this technique was observed to induce fine calcite nanoparticles with diameter of 96.10 nm for SDS/PCC while SA/PCC leads to form vaterite nanoparticles with diameter of 55.59 nm. The products were subjected to Scanning Electron Microscopy (SEM), X-Ray Diffraction (XRD) and Fourier Transform Infrared Spectroscopy (FT-IR) analysis to study the morphology, crystallinity, and presence of surfactants. To determine the nature of adsorption of anionic surfactants on PCC surface, Thermogravimetric Analysis (TGA/DTG) was performed. Contact angles measured by drop shape analyzer were recorded as 155.29° and 154.15° for PCC/SDS and PCC/SA respectively. Average crystalline sizes calculated by Debye-Scherrer equation were 44.52 nm and 34.79 nm for SDS/PCC and SA/PCC respectively. The degree of particle agglomeration was minimum in both products. Synthesized super-hydrophobic products were coated and tested on materials of rubber and plastics to improve their durability¹. Considering the simplicity and efficiency in the synthesis procedure, it has a higher potential in industrial scale utilization.

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