

Preparation and characterization of silica from rice hull

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Rice hull silica samples were obtained by combustion of rice hull at temperatures ranging from 500°C to 1000°C. The silica samples were characterized by X-ray powder diffraction (XRD), scanning electron microscopy (SEM), energy-dispersive X-ray analysis, Fourier transform infrared spectroscopy (FT-IR), N₂ adsorption/desorption, thermal gravimetric analysis (TGA), elemental analysis as well as CO₂ adsorption performance. XRD analysis showed that the rice hull silica existed in an amorphous form when the combustion temperature of rice hull varied between 500°C and 700°C. However, for the temperatures over 700°C, the crystalline structure of silica materials were obtained. With increasing combustion temperature of the rice hull, the surface area of rice hull silica decreased. In addition, we prepared amine-grafted rice hull silica using 3-aminopropyltriethoxysilane and investigated for CO₂ adsorption. The CO₂ adsorption capacity was significantly increased after grafting 3-aminopropyltriethoxysilane on rice hull silica. The desorption was complete for all the amine-grafted rice hull silica adsorbents as well as the parent rice hull silica support.