

Effect of temperature towards rice husk silica characterization with different preparation methods

ABSTRACT

Rice Husk Ash (RHA) ceramic presented in this paper undergoes different preparation methods. This study reported a comparison in terms of product quality, yield, structure and processing time between acid leaching techniques (HCl) to the other non-treated acid leaching. In this research, the White Rice Husk Ash (WRHA) pellets were prepared by cleaning the Rice Husk (RH) with distilled water and HCl acid respectively. The raw material, RH was going through thermal treatment in order to produce white ash powder then milled into nano-sized powder via high-energy ball milling (HEBM). To subject the samples to a series of temperatures, the pressed pellets went through multi-sample sintering, where the samples were sintered at 800°C, 1000°C, 1100°C and 1200°C for each batch. The percentage of density and porosity respectively increases and decreases with the increasing of sintering temperature. During the sintering process, the grain size increased, which caused less porosity and giving higher density in the sample. The comparative XRD plot of the sintered samples at various temperatures prepared by different cleaning route showed the difference between the amorphous and crystalline silica. The XRD spectra reveal that the main phase for crystallization was cristobalite and tridynamite. The FESEM images displayed the comparative morphological features of the samples. The grain sizes were observed to be smaller by acid leach treatment. Acid leaching of rice husks prior to combustion resulted in smaller particle size, larger surface area in comparison with ash from non-acid treated husks (NTR).

Keyword: Rice husk silica; Cristobalite; Acid-leach treatment; High energy ball milling