

Investigation into the Morphology, Composition, Structure and Dry Tribological Behavior of Rice Husk Ceramic Particles

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Abstract:

To expand the application of rice husk (RH) resource, this study developed carbon-based RH ceramic (RHC) particles using a common high-temperature carbonization method. The morphology, composition, and structure of the RHC particles were characterized with a series of modern analysis technologies and were then compared with those of the initial RH powder and carbonized RH (CRH) particles. The dry tribological behavior of RHC particle adobes (RHAs) was also investigated. Results showed the sheet-shaped morphology of the RHC particles. The graphitization degree of the RHC particles was lower than that of the CRH particles possibly because the phenolic resin (PR) filled the micro-pores of the RH particles, thereby prompting the formation of amorphous carbon in the RHC particles as a result of high-temperature carbonization. The appearance of a hydroxy function group (–OH) on the surface of the RHC particles was ascribed to the decomposition of PR at 900 °C. The friction coefficients and mass loss rates of the RHAs almost increased with the rise in load and velocity. In addition, the friction coefficients of the RHAs decreased at high load (5 N) and velocity (0.261 m/s) conditions. Such outcome indicated that the variation of contact area between steel ball and RHA at high load and velocity conditions resulted in the abrasive wear or catastrophic wear.

Keyword: Rice husk ceramic particles, Morphology, Composition and structure, Dry friction

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