Accepted Manuscript

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PII: S0169-4332(16)00153-7

DOI: http://dx.doi.org/doi:10.1016/j.apsusc.2016.01.116

Reference: APSUSC 32348

To appear in: APSUSC

Received date: 27-9-2015 Revised date: 12-1-2016 Accepted date: 14-1-2016

Please cite this article as: E. Hu, K. Hu, Z. Xu, X. Hu, K.D. Dearn, Y. Xu, Y. Xu, L. Xu, Investigation into the Morphology, Composition, Structure and Dry Tribological Behavior of Rice Husk Ceramic Particles, *Applied Surface Science* (2016), http://dx.doi.org/10.1016/j.apsusc.2016.01.116

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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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