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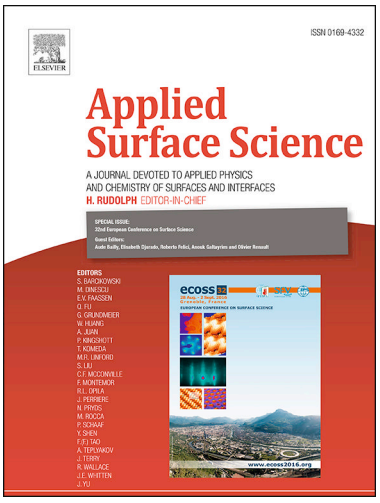

Full Length Article

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Characterization and Tribological Properties of Rice Husk Carbon Nanoparticles Co-doped with Sulfur and Nitrogen

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Abstract:

A novel carbon nanoparticle co-doped with sulfur and nitrogen (S, N−CN) was prepared from rice husk powder through a hydrothermal reaction. A series of modern analysis techniques was utilized to characterize the morphology, structure, and components of the S, N−CN nanoparticles. Their tribological properties as a lubricating additive to polyethylene glycol (PEG200) base oil were investigated using a UMT-2 sliding tribometer. Results showed that the average diameter of nanoparticles were approximately 16 nm. The nanoparticles mainly included C, O, N, and S. The I_D/I_G value of S, N−CN was 2.63. PEG200 that included different contents of S, N−CN displayed remarkable lubricating performance compared with pure PEG200 under different loads (8, 20, 40, and 100 N). When 0.1 wt% S, N−CN was dispersed in base oil, the friction coefficient and wear rate decreased by 16.6% and 75.9%, respectively. The friction and wear mechanisms were attributed to robust tribo-films that had developed as a result of tribo-chemical reactions induced by the S, N−CN particles, comprising nitrides, sulfides, and metal oxides to promote wear resistance and friction reduction properties of PEG200.

Key words: Rice husk, Hydrothermal reaction, Nanoparticles, Friction and wear[1]

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