Effect of particle size of copper powder on mechanical and tribological properties of semi-carbonized copper/phenolic resin-base semi-metallic friction materials

1Hsun-Yu Lin, 1Yi-Fang Kuo, 2Kuo-Jung Lee, 1Jin-Huey Chern Lin, 1*Chien-Ping Ju

1Department of Materials Science and Engineering, National Cheng-Kung University, Tainan, Taiwan.
2Department of Materials Science and Engineering, I-Shou University, Kaohsiung, Taiwan
*Corresponding author

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Email address: ju_servantofchrist@yahoo.com

The purpose of this research is to investigate the effects of the particle size of copper powder on mechanical and tribological properties of semi-carbonized copper/phenolic resin-based semi-metallic friction materials. Three different particle sizes (0.5, 50, and 420 μm) were selected for the study. The results indicate that toughness increases, while hardness and wear decrease, with particle size of the specimens. The specimens with an average particle size of 50 μm have higher compressive strength and coefficient of friction than those with other two average particle sizes. Scanning electron microscopic examination reveals that, when the average particle size of copper powder is about 0.5 μm, the copper particles are sintered into large, porous particles with carbon adhering on the interface and within pores of the porous particles. When the average particle size of copper powder is about 50 μm, the copper particles are bonded tightly. When the particle size of copper powder is about 420 μm, copper particles are non-uniformly distributed with carbon filling the gaps among the particles.

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