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Copper-impregnated Graphite Composite for a Cryogenic Shaft Seal

Using graphite as matrix material and copper alloy as infiltration material, we prepared a copper-graphite composite by press impregnation method. Some physical properties of the composite, such as hardness, thermal conductivity coefficient, linear coefficient of expansion, density and porosity, have been tested and compared with the matrix material. The micrographs obtained by the metalloscope shows that the copper impregnated in the composite forms continuous phase, which could significantly enhance the strength of the composite material. The friction coefficient of the copper graphite composite by experimental determination is slightly less than the matrix material, indicating that the friction property of the composite is still dominated by the property of the graphite. The composite material has been applied to centrifugal pump shaft seal. The wear behavior and strength of the seal is tested under liquid oxygen condition. The results show that the seal structure can realize more than 2000 hours'stable operation without leakage and the composite is suitable for cryogenic seal.

Keywords: copper impregnation, graphite, composite, cryogenic, seal

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