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Thermal and Mechanical Characterization of Epoxy Resin Containing Amorphous Co-B Particles

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Abstract – Epoxy resins are one of the most versatile polymers under use today. The wear resistance and thermal stability of epoxy resins are enhanced by the use of boron oxide as filler. Borohydride reduction of cobalt ions in nonaqueous medium produce a amorphous powder containing metallic cobalt and boron homogeneously mixed. The use of this amorphous powder as boron oxide source in the preparation of epoxy resin composites was never studied, to the best of our knowledge. In this work, epoxy resin composites containing amorphous Co-B particles were prepared and characterized.

Epoxy resins are one of the most versatile polymers under use today. Their use ranges from matrix in high performance composite materials for aerospace structures, to organic coatings and common adhesives for domestic applications. The wear resistance and thermal stability of epoxy resins are enhanced by the use of boron oxide as filler[1-2]. Borohydride reduction of cobalt ions in nonaqueous medium produce a amorphous powder containing metallic cobalt and boron homogeneously mixed[3]. The use of this amorphous powder as boron oxide source in the preparation of epoxy resin composites was never studied, to the best of our knowledge. Furthermore, the presence of metallic cobalt particles will provide magnetic properties to composite that can be used for wear rate determination using magnetic methods and/or electromagnetic shielding. In this work, epoxy resin composites containing amorphous Co-B particles were prepared and characterized. For better analysis of theses composites, epoxy resin composites containing nanocrystalline magnetite particles were prepared for comparison. The product of the pyrolysis of the composites at 800 °C was compared with the samples of the calcined particles at same temperature using X-ray diffractometry. The modification of the thermal decomposition or oxidation of the particles due the interaction with the polymer was investigated. Raman spectroscopy was used to monitor the polymerization of the composites. Also the mechanical properties (Young modulus and Vicker hardness) were studied.

References

[1] B. R. Burroughs, Tribology Transactions 42, (1999) 592-600.
[2] M. Jimenez, Surface & Coatings Technology 201, (2006) 979-987.
[3] G. N. Glavee, Inorganic Chemistry 32, 4 (1993) 474-477.