

# **Epoxy composite reinforced with nano and micro SiC particles: curing kinetics and mechanical properties**

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## **Abstract-**

**Epoxy-based composite materials reinforced with hard particles can be used as anti-wear coatings. In this study, a commercial bicomponent resin was used, with 6 and 12% SiC particles in two different particle sizes (nano and 10 &micro;m). The epoxy curing process was studied by Fourier transform infrared spectroscopy (FTIR), differential scanning calorimetry (DSC) and confocal microscopy. Dynamic mechanical thermal analysis (DMTA) tests evaluated the influence of particle additions on the glass transition temperature ( $T_g$ ). In addition, mechanical properties (hardness and bending strength) and wear resistance were evaluated. The addition of nanometric particles reduced the reaction order. A higher amount of particles decreased  $T_g$  due to the lower number of crosslinking points. The agglomeration of nano particles led to non-uniform mechanical properties. 6% nano particle addition dramatically improved wear resistance and decreased the friction coefficient.**

**Index Terms-** Cure behavior, mechanical properties, silicon carbide, thermosetting resin.

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