

## **Aging by moisture and/or temperature of epoxy/SiC composites: thermal and mechanical properties**

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**Abstract—** The present work focuses on investigating the effects of moisture absorption on the mechanical and thermal properties of epoxy reinforced with percentage (by wt.) silicon carbide (nano and micro-metric) composites. In order to quantify the effect of moisture and temperature on aging, the specimens were exposed to three aging conditions for 30 days. Variations of Tg (glass transition temperature), water absorption, and mechanical properties were determined as a function of exposure time.

In composite materials, aging depends on the exposure conditions, such as amount of absorbed water, temperature, and oxygen concentration. All these factors affect the thermal and mechanical properties. At room temperature and 95% relative humidity, plasticizing and swelling occur, with mechanical properties loss. At 60 C and 5% relative humidity,, polymeric chains crosslink resulting in mechanical properties improvement; Tg and thermal conductivity increase. At 60 C and 95% relative humidity, the time required to reach saturation decreases when compared to room temperature evaluated condition, as the exposure temperature increases.

**Index Terms—** Aging, epoxy, SiC, thermal properties, mechanical properties

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