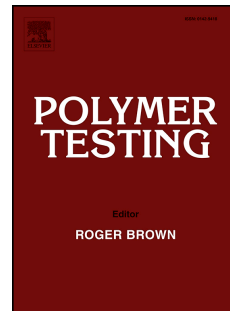


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Material Properties

**Cross-Property Interaction between Stiffness, Damage and Thermal Conductivity in
Particulate Nanocomposite**

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Abstract

A nanocomposite made from epoxy and nano silica particles was subjected to compressive fatigue loading and the resulting interaction between stiffness, damage and thermal conductivity investigated. First, the thermal conductivity (K) and the elastic modulus (E) of the as-fabricated materials were measured prior to any fatigue loading. Then, the samples were subjected to cyclic loading, and the thermal conductivity and the modulus of elasticity of the specimens were measured after every 5 to 10 thousand cycle intervals until a significant change in the response of the material was observed. In addition, a semi-analytical model is proposed to quantify damage in the material by taking the modulus of elasticity and thermal conductivity data obtained from the experiment. Finally, the cross-property relation between the modulus of elasticity, the thermal conductivity and the damage density in the material at any state of the fatigue cycle is investigated.

Key Words: Matrix Micro-Crack, Nanocomposite, Thermal Conductivity, Cross-Property, Stiffness Degradation

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