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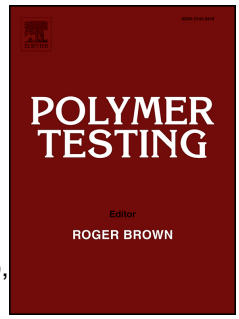

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PII: S0142-9418(17)30930-3

DOI: 10.1016/j.polymertesting.2017.09.038

Reference: POTE 5193

To appear in: *Polymer Testing*

Received Date: 9 July 2017

Accepted Date: 26 September 2017

Please cite this article as: J. Hu, W. Chen, P. Fan, J. Gao, G. Fang, Z. Cao, F. Peng, Uniaxial tensile tests and dynamic mechanical analysis of satin weave reinforced epoxy shape memory polymer composite, *Polymer Testing* (2017), doi: 10.1016/j.polymertesting.2017.09.038.

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Uniaxial tensile tests and dynamic mechanical analysis of satin weave reinforced epoxy shape memory polymer composite

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Abstract: The utilization of epoxy shape memory polymer composite (SMPCs) as engineering materials for deployable structures has attracted considerable attention in recent decades due to high strength and satisfactory stiffness in comparison with shape memory polymers (SMPs). Knowledge of static and dynamic mechanical properties is essential for analyzing structural behavior and recovery properties, especially for new epoxy SMPCs. In this paper, a new weave reinforced epoxy shape memory polymer composite was prepared with satin weave technique and resin transfer molding technique. Uniaxial tensile tests and dynamic mechanical analysis were carried out to obtain basic mechanical properties and glass transition temperatures, respectively.

The tensile strength and breaking elongation of warp specimens were relatively lower than those of weft specimens due to yarn number and weave geometry. The increment of elastic modulus and hysteresis loop areas became smaller with loading cycles, meaning that cyclic tests could obtain approximate stable mechanical properties. For dynamic mechanical properties, glass transition temperature (T_g) obtained from storage modulus curves was lower than that determined from tan delta curves and T_gs in the warp and weft directions were comparable (29.4 ^{o}C vs 29.7 ^{o}C).

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