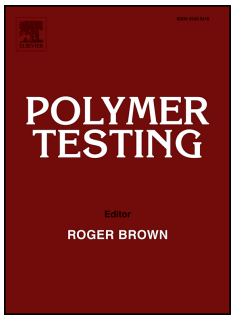

Creation of a nanovascular network by electrospun sacrificial nanofibers for self-healing applications and its effect on the flexural properties of the bulk material

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Material Properties

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ABSTRACT:

Composites, increasingly significant due to their excellent properties, are prone to failure over time. Self-healing materials are being developed to extend their lifetime. Despite continuous progress, the effect of introducing such healing feature on the mechanical properties of the neat material is mainly overlooked. Therefore, we created a nanocomposite and a nanovascular network by pullulan sacrificial nanofibers, and analysed the flexural properties in comparison to the neat matrix. A parameter analysis of the electrospinning process allowed production of tailored pullulan nanofibers. Their introduction showed no effect on the strength and modulus of the epoxy matrix. On removal of the pullulan nanofibers, the properties of the resultant nanovascularized epoxy were somewhat reduced relative to the neat epoxy depending on volume fraction and diameter of the nanochannels. Interestingly, the decrease of mechanical properties of the nanovascular epoxy is lower than by introducing microcapsules,