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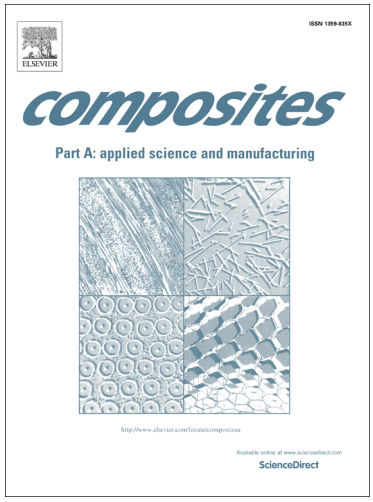

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Abstract

Tri-axial electrospun fibers with self-healing capability are fabricated through a direct, one-step tri-axial electrospinning process. They have been designed to have two distinct protective walls to encapsulate epoxy resin and its hardener as healing agents in separate cores. The presence of an extra layer between encapsulated liquid healing agent and outer layer enables the encapsulation of chemically and physically active healing agents, extends the efficiency and life-time of the healing functionality. Tri-axial electrospun healing fibers are incorporated to add self-healing capability into solo epoxy matrix and also utilized as an interlayer between glass fabric mats in glass fiber reinforced composite. Tri-axial electrospun fiber interlayers provide self-healing functionality at the interface of glass fibers with epoxy matrix, which is highly prone to failure. In addition, various structural health monitoring and non-destructive testing techniques coupled with traditional mechanical testing methods are employed to evaluate the self-healing efficiency of composite structures. In this study, successful and recurring self-healing ability of composite structures at the interface of glass fiber with the epoxy matrix are achieved and confirmed using different characterization techniques.