



Nanotube Superfiber Materials: Chapter 22. Multiscale Laminated Composite Materials (Micro and Nano Technologies)

Yi Song, Bolaji Suberu, Vesselin Shanov, Mark Schulz

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Multiscale laminated composite materials are formed by adding carbon nanotube (CNT) materials to microfiber laminated composites. CNTs reinforce the weak failure modes of laminated composites. Laminated composite materials provide high specific strength and high performance but have low interlaminar shear modulus and shear strength due to the lack of fiber in the transverse or out-of-plane direction. The weak interlaminar property may lead to premature failure of composite structures. Therefore, it is necessary to reinforce polymeric laminated composites in the transverse direction. CNT materials have excellent mechanical, thermal and electrical properties and are integrated into polymeric composites as reinforcement. These composite laminates using CNT materials are called multiscale composites. In this research, multiwalled carbon nanotube (MWCNT) arrays are integrated between the carbon fabric plies of laminated composites and work as a bridge to interlock adjacent carbon fabric plies together. The MWCNT arrays are arranged within the laminated composite so that the laminate interfaces have higher interlaminar properties. The mechanical response of these composite materials under quasi-static loading including interlaminar shear is described in this chapter.

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