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材料科学与工程

界面强度对纤维复合材料破坏及力学性能的影响

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摘要:

界面作为复合材料中的重要组成部分对其宏观力学性能及破坏模式有着不可忽视的影响. 本文采用自组装薄膜技术对玻璃纤维表面改性, 得到不同表面性质的玻璃纤维, 与环氧树脂基体复合得到不同界面强度的复合材料. 利用带偏光显微镜的拉伸仪, 研究在不同界面强度下玻璃纤维/环氧树脂基复合材料的破坏过程及力学性能. 结果表明, 复合材料在强界面情况下发生脆性破坏, 在弱界面情况下发生韧性破坏, 且增强纤维对复合材料性能的增强效果与界面强度有关.

关键词: 复合材料 玻璃纤维 环氧树脂 界面 力学性能

Influence of interfacial strength on fracture process and mechanical properties of fiber composites

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Abstract:

The interface is one of the key components of composite materials, which plays an important role in the fracture process and mechanical properties. In the current work, glass fiber surfaces were treated via the self assembly monolayer method. The fracture process and mechanical properties of composites with different interfacial strength were investigated by a home made tensile tester with an additional polarizing microscope. The results showed that in the case of a strong interface between the reinforcing fiber and matrix, the composites fracture in brittle mode, whereas in the case of a weak interface, the composites fracture in ductile mode. Furthermore, the reinforcing efficiency of the composite is related to the interfacial strength.

Keywords: composites glass fiber epoxy interface mechanical properties

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