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Effect of micro-Al_2O_3 contents on mechanical property of carbon fiber reinforced epoxy matrix composites

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Abstract

The effects of integrating micro-Al_2O_3 onto carbon fiber surface and its contents on mechanical properties of carbon fiber reinforced polymer composites were investigated. Mode II interlaminar fracture toughness, impact strength, flexural properties and initial modulus were determined by mechanical test machines and dynamic mechanical analyzer. The reason for performance improvement was discussed based on scanning electron microscopy. The mode II interlaminar fracture toughness, impact strength, and flexural strength of composites without addition of micro-Al_2O_3 were 348 J/m^2, 118 kJ/m^2 and 682 MPa, respectively. However, the mechanical properties of modified composites were improved significantly. The mechanical properties were optimum when the areal density of micro-Al_2O_3 particles reached 15 g/m^2 at which the mode II interlaminar fracture toughness, impact strength, and flexural strength reached 522 J/m^2, 161.7 kJ/m^2 and 759 MPa, respectively. Furthermore, these composites with addition micro-Al_2O_3 in the layers showed an improvement in thermal property.

Keywords: A. Layered structure; A. Polymer-matrix composites; B. Delamination; B. Mechanical properties; C. Lay-up.

1. Introduction

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