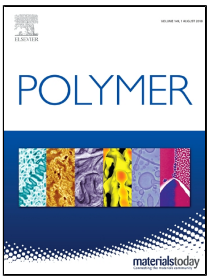
Accepted Manuscript



Epoxy Toughening with Graphite Fluoride: Toward High Toughness and Strength

Fan Lei, Chentao Zhang, Zepeng Cai, Junlong Yang, Haoyang Sun, Dazhi Sun

PII:	S0032-3861(18)30697-9
DOI:	10.1016/j.polymer.2018.07.084
Reference:	JPOL 20803
To appear in:	*Polymer*
Received Date:	25 May 2018
Accepted Date:	29 July 2018

Please cite this article as: Fan Lei, Chentao Zhang, Zepeng Cai, Junlong Yang, Haoyang Sun, Dazhi Sun, Epoxy Toughening with Graphite Fluoride: Toward High Toughness and Strength, *Polymer* (2018), doi: 10.1016/j.polymer.2018.07.084

Epoxy Toughening with Graphite Fluoride: Toward High Toughness and Strength

Fan Lei, Chentao Zhang, Zepeng Cai, Junlong Yang, Haoyang Sun, Dazhi Sun*

Shenzhen Key Laboratory of Nanoimprint Technology, Department of Materials Science and Engineering, Southern University of Science and Technology, Shenzhen, Guangdong 518055, China

Abstract

Epoxy composites with excellent toughness and strength have been successfully fabricated by direct incorporation of graphite fluoride (GrF) without using any solvent or surfactant modification. Owing to the strong interfacial interactions, the glass transition temperature of GrF/epoxy composites exhibits a significant improvement as observed by dynamic mechanical analysis. Mechanical characterizations on GrF/epoxy composites suggest that the optimal increase of tensile strength and Young's modulus is achieved at a low filler concentration of 0.5 wt.%, which is attributed to the favorable level of the GrF dispersion in the epoxy matrix. A maximum toughening effect is obtained at the concentration of 1 wt.% GrF in the epoxy matrix with a 1.5-fold improvement in fracture toughness. The generation of crack pinning and crack deflection in epoxy due to the existence of GrF platelets is proposed to be the main toughening mechanism. Besides, microcracks resulted from pulling out, layer breakage and interfacial debonding of GrF platelets also contribute to the improvement in the fracture toughness of GrF/epoxy composites.

Keywords: graphite fluoride, epoxy, toughening mechanism