

## Accepted Manuscript

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Guansong He, Jiang Li, Fengshun Zhang, Chao Wang, Shaoyun Guo

PII: S0266-3538(14)00161-4  
DOI: <http://dx.doi.org/10.1016/j.compscitech.2014.05.014>  
Reference: CSTE 5814

To appear in: *Composites Science and Technology*

Received Date: 29 January 2014  
Revised Date: 12 May 2014  
Accepted Date: 13 May 2014

Please cite this article as: He, G., Li, J., Zhang, F., Wang, C., Guo, S., Effect of multistage tensile extrusion induced fiber orientation on fracture characteristics of high density polyethylene/short glass fiber composites, *Composites Science and Technology* (2014), doi: <http://dx.doi.org/10.1016/j.compscitech.2014.05.014>

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**Effect of multistage tensile extrusion induced fiber orientation on  
fracture characteristics of high density polyethylene/short glass fiber  
composites**

Guansong He, Jiang Li\*, Fengshun Zhang, Chao Wang, Shaoyun Guo\*

*The State Key Laboratory of Polymer Materials Engineering, Polymer Research*

*Institute of Sichuan University, Chengdu 610065, China*

**ABSTRACT**

The high density polyethylene (HDPE)/short glass fiber (SGF) composites were prepared by multistage tensile extrusion with an assembly of laminating-multiplying elements (LMEs) connecting with an extruder. The strong shear and elongational force field in LME could make the fibers orientated along the melt flow direction. The degree of fiber orientation could be controlled by the number of LMEs. The SEM morphological observations illustrated that the fiber orientation degree was gradually increased by increasing the number of LMEs. However, the fiber length distribution and crystallinity of composites did not change much with increasing the LMEs, and would not affect the mechanical properties. The essential work of fracture (EWF) analysis at quasi-static rate of loading showed that the fracture toughness along the melt flow direction increased with the number of LMEs increasing because of the change of the fiber related damage mechanism. An opposite trend was found if samples were stretched perpendicular to the melt flow direction.

Keywords: A. Glass fibres, A. Short-fibre composites, B. Fracture toughness, C. Crack, E. Extrusion;

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\* To whom correspondence should be addressed. (Prof. Li, Email: [li\\_jiang@scu.edu.cn](mailto:li_jiang@scu.edu.cn), Fax: 86-028-85466077)

\* To whom correspondence should be addressed. (Prof. Guo, Email: [nic7702@scu.edu.cn](mailto:nic7702@scu.edu.cn), Fax: 86-28-85405135)

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