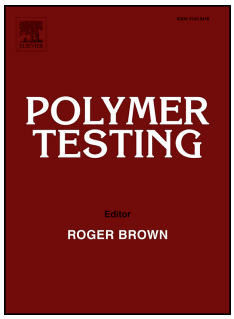
Accepted Manuscript



Effect of crumb rubber on mechanical properties of multi-phase syntactic foams

Thong M. Pham, Jim Kingston, Gary Strickland, Wensu Chen, Hong Hao

PII: S0142-9418(17)31374-0

DOI: 10.1016/j.polymertesting.2017.12.033

Reference: POTE 5285

To appear in: *Polymer Testing*

Received Date: 24 September 2017

Revised Date: 6 November 2017

Accepted Date: 30 December 2017

Please cite this article as: T.M. Pham, J. Kingston, G. Strickland, W. Chen, H. Hao, Effect of crumb rubber on mechanical properties of multi-phase syntactic foams, *Polymer Testing* (2018), doi: 10.1016/j.polymertesting.2017.12.033.

Effect of Crumb Rubber on Mechanical Properties of Multi-phase Syntactic Foams

Thong M. Pham[1], Jim Kingston[2], Gary Strickland[2], Wensu Chen[1] and Hong Hao[1*]

[1]Center for Infrastructural Monitoring and Protection, School of Civil and Mechanical Engineering, Curtin University, Kent Street, Bentley, WA 6102, Australia

[2] Matrix Composites & Engineering, 150 Quill Way, Henderson, WA 6166, Australia

[*]Corresponding author's email: hong.hao@curtin.edu.au

Abstract

Syntactic foam is a lightweight and strong material which can be used in marine and aeronautical applications. However, the brittleness of the material limits its application to a broader range. Adding crumb rubber to the syntactic foam can increase its energy absorption capacity. The effect of crumb rubber on the fracture toughness and energy absorption capacity of 2-phase and 3-phase syntactic foam is evaluated under both static and impact loads. The experimental results have shown that the fracture toughness of the 2-phase rubberized syntactic foam increased by 8% while an increase of 22% of its fracture energy was observed. Under quasi-static loads, the 3-phase rubberized syntactic foam showed decreases in the compressive strength and elastic modulus but an increase in the energy absorption capacity as compared to the syntactic foam without crumb rubber. In addition, the impact energy absorption of the 3-phase rubberized syntactic foam increased by 24% as compared to that of the 3-phase syntactic foam without crumb rubber.

Keywords: Syntactic foam; Impact behaviour, Energy absorption; Fracture toughness; Crumb rubber.