

(116)

Acoustic Emission as a Screening Tool for Ceramic Matrix Composites

Greg Ojard¹, Dan Goberman¹, and John Holowczak¹, ¹United Technologies Research Center, 411 Silver Lane, East Hartford, CT 06108

Ceramic matrix composites are composite materials with ceramic fibers in a high temperature matrix of ceramic or glass-ceramic. This emerging class of materials is viewed as enabling for efficiency improvements in many energy conversion systems. The key controlling property of ceramic matrix composites is a relatively weak interface between the matrix and the fiber that aids crack deflection and fiber pullout resulting in greatly increased toughness over monolithic ceramics. United Technologies Research Center has been investigating glass-ceramic composite systems as a tool to understand processing effects on material performance related to the performance of the weak interface. Changes in the interface have been shown to affect the mechanical performance observed in flexural testing and subsequent microstructural investigations have confirmed the performance (or lack thereof) of the interface coating. Recently, the addition of acoustic emission testing during flexural testing has aided the understanding of the characteristics of the interface and its performance. The acoustic emission onset stress changes with strength and toughness and this could be a quality tool in screening the material before further development and use. The results of testing and analysis will be shown and additional material from other ceramic matrix composite systems may be included to show trends.