

Quantitate assessment of ballistic damage of a plain-weave S-2 glass epoxy composite

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In this study, we have reported a strategy to visually analyze and quantify macroscale and mesoscale damage on a single layer S-2 glass epoxy composite laminate, which was clamped in a 8 inch diameter circular frame and impacted by a 0.22 caliber right circular cylindrical steel projectile at initial velocities ranging from 104 m/s to 472 m/s. High-resolution images were obtained at the point of impact and up to the edge of the circular frame using an 80MP camera. Each sample was inspected for four types of mesoscale damage, i.e., transverse-tow cracks, tow-tow delamination, 45° matrix cracks and punch shear. Scanning electron microscope (SEM) was used to analyze visualized damage for single fibers at the center of the impact site while the developed MATLAB program was utilized to translate the image data into a digital damage map whereby the output of color intensity correlated with the quantity and type of material damage. Digital maps generated from the analyzed specimens revealed that the common damage in all samples were transverse-tow matrix cracks and tow-tow delamination.

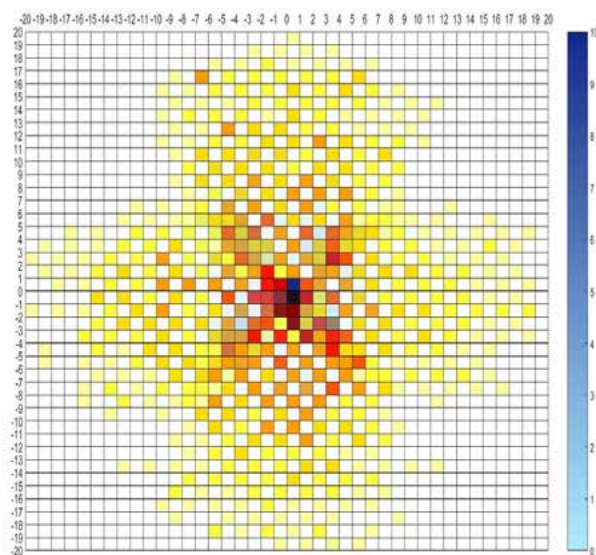


Figure 1: TEM micrograph of dendrites edges in a basalt glass-ceramic from Tenerife melted in reduced atmosphere (sample VRTF1)

Biography

Kadir Aslan is a Chemical Engineer by training and a Professor of Chemistry. He is an expert in plasmonics, imaging and spectroscopic techniques. He has managed over \$1.94 million in competitive research funding to date, mentored over 90 Undergraduate, Graduate students and Postdocs, published over 130 peer-reviewed journal articles, 15 book chapters and has 4 patents. His work was cited over 6500 times and has an h-index of 42. His research group currently has Postdoctoral Research Associates, PhD students, MS students and Undergraduate students with Science and Engineering background.

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