Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Depth Profiling of Polymer Composites by Ultrafast Laser Ablation CHRISTOPHER YOUNG, CLIVE CLAYTON, Dept. of Materials Science & Engineering, Stony Brook University, JON LONGTIN, Dept. of Mechanical Engineering, Stony Brook University — Past work has shown femtosecond laser ablation to be an athermal process at low fluences in polymer systems. The ablation rate in this low fluence regime is very low, allowing for micro-scale removal of material. We have taken advantage of this fact to perform shallow depth profiling ablation on carbon fiber reinforced polymer (CFRP) composites. Neat composite and resin samples were studied to establish reference ablation profiles. These profiles and the effects of the heterogeneous distribution of carbon fibers were observed through confocal laser profilometry and optical and scanning electron microscopy. Weathered materials that have been subjected to accelerated tests in artificial sunlight or water conditions were ablated to determine the correlation between exposure and change in ablation characteristics. Preliminary Raman and micro-ATR analysis performed before and after ablation shows no chemical changes indicative of thermal effects. The low-volume-ablation property was utilized in an attempt to expose the sizing-matrix interphase for analysis.

Christopher Young
Dept. of Materials Science & Engineering, Stony Brook University

Date submitted: 29 Nov 2008 Electronic form version 1.4