

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Carbon Black Haloing of Clay and Its Influence on Electrical and Mechanical Properties of Epoxy Composites¹ KRISHNA ETIKA, MICHAEL COX, JAIME GRUNLAN — Studies of acetone-based suspensions suggest a synergistic stabilization of clay by carbon black (CB) that involves a haloing effect (i.e., CB surrounding clay). This unique microstructure influences the electrical and mechanical properties of epoxy composites that contain both particles. With the addition of 0.5 wt% clay, electrical conductivity increases by an order of magnitude for CB-filled epoxy (relative to composites containing no clay), but no significant improvement is observed in storage modulus. Composites containing equal concentrations of CB and clay show reduced electrical conductivity, but significant improvement in storage modulus (relative to composites containing equal amount (wt%) of either CB or clay alone). Both electrical conductivity and storage modulus improve in composites containing a 1:2 clay:CB (wt/wt) ratio. This synergy between CB and clay is a useful tool for simultaneously improving the electrical and mechanical properties of solution processed composites. Similar synergy has also been observed with carbon nanotubes and clay, which has resulted in a dramatic reduction in percolation threshold.

¹The authors would like to acknowledge financial support for this work from the Texas Engineering Experiment Station (TEES) and the National Science Foundation (CMMI 0644055).

Jaime Grunlan
Texas A&M University

Date submitted: 19 Nov 2009

Electronic form version 1.4