Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Ultrafast Optical Measurements of Thermal Conductivity and Sound Velocity of Amorphous SiC[1] DONALD HONDONGWA, LAUREN OLASOV, BRIAN DALY, Vassar College, SEAN KING, JEFF BIELEFELD, Intel Corporation — We present ultrafast optical measurements of longitudinal sound velocity and thermal transport in hydrogenated amorphous carbon (a-SiC:H) films. The films were grown on Si wafers by PECVD using combinations of methylsilanes and H_2 and He diluent gases. The films were well characterized and found to have densities (1.0 – 2.5 g cm^{-3}) and dielectric constants (2.8 – 7.2) that spanned a wide range of values. Prior to their measurement, the a-SiC:H films were coated with 40-70 nm of polycrystalline Al. The pump-probe measurements were performed at room temperature using a modelocked Ti:sapphire laser. Transient reflectivity changes that are associated with very high frequency sound waves (picosecond ultrasonics) and the cooling rate of the SiC sample (Time Domain Thermorerflectance (TDTR)) were measured. We extract values for the thermal conductivity and sound velocity of the SiC films, and analyze the results in terms of rigidity percolation effects within the SiC layers.

[1]This work was supported by NSF award DMR-0906753.

Brian Daly
Vassar College

Date submitted: 16 Nov 2010 Electronic form version 1.4