Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Flow Kills Conductivity of Single Wall Carbon Nanotubes (SWNT) Composites SANJIV BHATT, Entegris Inc., Chaska, MN, CHRISTOPHER MACOSKO, Department of Chemical Engineering and Materials Science, University of Minnesota — Most composites of polymer and single wall carbon nanotubes (SWNT) reported in the literature are made by solvent casting or simple compression molding. Commercial utility of these composites requires use of precision injection molding. We have observed a unique behavior wherein the SWNT composites made by injection molding or by extrusion are insulators but upon heating become electrically conductive. This behavior appears to be the result of a relaxation phenomenon in the SWNT composite. During flow into an injection mold or through an extrusion die the well-dispersed SWNT in the polymer matrix tend to align such that they are not in contact with each other and are farther than the minimum required distance, 5 nm (1), to achieve electrical percolation through electron hopping. Upon heating the SWNT relax and either touch each other or are at a distance less than or equal to 5 nm from each other to create a percolating.

[1] Du, F., Scogna, R, C., Zhou, W., Brand, Stijn, Fischer, J. E., and Winey, K. I., Macromolecules 2004, 37, 9048-9055.

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Date submitted: 23 Nov 2005 Electronic form version 1.4