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Multi-Walled Carbon Nanotube Network Formation in Extruded High Density Polyethylene/MWNT Composites¹ FRANK YEPEZ CASTILLO, BRIAN P. GRADY, DANIEL E. RESASCO, The University of Oklahoma — Multi-walled carbon nanotube (MWNT) / high density polyethylene (HDPE) composites with varying amounts of carbon nanotubes were investigated and the effect of MWNT weight fraction on their electrical conductivity, crystallinity and mechanical properties is presented here. Samples were prepared by melt dilution of a HDPE masterbatch containing 20 wt% MWNT with varying amounts of neat HDPE. Conductivity measurements on compression molded samples showed that electrical percolation occurs at 4.5 wt% MWNTs. The effect of processing conditions on the formation of a MWNT network in extruded samples was assessed by the addition of a low-shear annealing zone (shear rate 1-10 s⁻¹) before final extrusion through a die. The time in the low shear zone was varied from almost zero to 90 sec. Extruded samples above the compression-molded percolation threshold were tested, and electrical conductivity did not develop. However, a significant increase in electrical conductivity was observed in these samples when annealed for 5 minutes at the same temperature.

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