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Mechanical Reinforcement of Functionalized Carbon Nanotube-Polyethylene Polymer Composites MERLYN PULIKKATHARA, VALERY KHABASHESKU, Rice Quantum Institute, Rice University — Carbon nanotube-polymer composites are promising materials for a variety of applications including space exploration and the aerospace industry. In this work, we functionalized and fabricated a series of single walled carbon nanotube (SWNT) composite samples using medium density polyethylene (MDPE). The composites were made by shear mixing melt processing of MDPE with up to 1 wt.% added pristine and functionalized SWNTs including fluoro (F), undecyl and urea SWNT-derivatives. The former two were prepared as described earlier, while the synthesis of the latter is a novel method that has been developed utilizing a solvent free reaction of fluoro-SWNT with molten urea. FTIR, Raman, and AFM data confirm that urea bonds covalently to the SWNT surface and displaces most of the fluorine. Initial tensile strength (TS) of the MDPE composites loaded with urea-F-SWNT reinforced 48% and undecyl-functionalized SWNTs show unprecedented reinforcement up to 185% compared to neat MDPE. These preliminary results show that these functionalized SWNT increased the mechanical strength in of MDPE composites. The FTIR, Raman, AFM, SEM, TEM, XPS, TGA, and TS data of studied materials will be presented.

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