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Simultaneous Dielectric Spectroscopy and X-ray Diffraction of Poly(ethylene terephthalate) and PET/Carbon Nanotube Nanocomposites BRET STENGER, LEI YU, PEGGY CEBE, Tufts University Department of Physics and Astronomy, CEBE RESEARCH GROUP TEAM — The crystallization of poly(ethylene terephthalate) (PET) and a nanocomposite of PET with multi-walled carbon nanotubes (MWCNTs) were studied by simultaneous wide and small angle X-ray diffraction and dielectric relaxation spectroscopy. Our purpose is to determine whether the MWCNTs affect the cold crystallization kinetics or phase structure of the PET host. The nanocomposites contained 2% MWCNT by weight, and were prepared by solution mixing, and then compression molding into film. Dielectric measurements were made at frequencies from 100 Hz to 1 MHz, in parallel plate geometry. Measurements of the samples during cold crystallization ($T_c \sim 100$ - 120°C) were used to investigate the relationship between the growth of crystals and the restriction of the molecular mobility of the amorphous phase. In agreement with previous work, results indicate that a heterogeneous distribution of amorphous regions exists, implying both interlamellar and interfibrillar/interspherulitic placement of the amorphous chains. Addition of carbon nanotubes to the PET increased the rate of cold crystallization, but did not affect the glass transition relaxation process.

Peggy Cebe
Tufts University Department of Physics and Astronomy

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