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Abstract:Composites were prepared by filling high density polyethylene (HDPE) with acetylene black (AC-CB) and high-structure CB (HG-CB), respectively. Optical properties of the composites were characterized with terahertz time-domain spectroscopy (THz-TDS). It was found that as frequency increases the absorption coefficients of the composites increase whereas the refractive indexes decrease. Both the absorption coefficient and refractive index increase with increasing the particle concentration. The HG-CB filled composites have larger absorption coefficient but smaller refractive index compared with that of the AC-CB composites at the same particle concentration. These phenomena are related to the different particulate structures and aggregate structures of the CB particles. Assuming that the dielectric loss in THz frequency range is mainly attributed to the electron transport within the conductive clusters and the interfacial polarization of HDPE, the information of relaxation time and relaxation strength was obtained through fitting the experimental results to two-Debye theory of dipole relaxation.