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Dielectric Properties of Poly(carbonate) Containing Oxide Nanoparticles STEVE GREENBAUM, Hunter College of CUNY, JOHN FONTANELLA, JJFontanella LLC, Annapolis, MD, JOHN BENDLER, BSC, Inc., Rapid City, SD, CHARLES EDMONDSON, MARY WINTERSGILL, U.S. Naval Academy, DAVID BOYLES, TSVETANKA FILIPOVA, South Dakota School of Mines and Technology, MARK WESTGATE, U.S. Naval Academy, ARMANDO RUA, XAVIER BOGLE, Hunter College of CUNY — Nanocomposite of poly(carbonate) (PC) and nanoscopic $BaTiO_3$ have been studied. The complex relative permittivity, $\varepsilon^* = \varepsilon' - j\varepsilon''$, at audio frequencies from 5K to about 500K and the room temperature breakdown strength have been determined. In addition, SEM, DSC and TGA studies have been carried out as well as variable temperature and pressure proton NMR relaxation measurements. ε' is 11 for PC containing 59 wt% of 50-70 nm diameter $BaTiO_3$ and ε' vs. nanoparticle content for the untreated nanoparticles is larger than would be expected on the basis of a recently proposed modified Hanai equation. In addition, the breakdown strength is low and decreases as nanoparticle content increases. Higher breakdown strength is observed when using surface treated nanoparticles. The gamma relaxation (200K and 1000 Hz) does not change as nanoparticle content increases to 59 wt-%. Also, a low temperature relaxation region (in the vicinity of 20K) is found in the heat-treated nanocomposites, which is associated with the nanoparticles themselves. Next, the breakdown strength increases as $BaTiO_3$ nanoparticle size increases from 50 nm to 500 nm. Finally, data for PC containing $SrTiO_3$, $BaZrO_3$, ZrO_2, TiO_2 or SiO_2 may be presented.

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