ELECTRICAL PROPERTIES OF PIEZOELETRIC PVDF - $BaTiO_3$ NANOCOMPOSITES

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The determination of the effective properties of composites continues is an important area of research in which several techniques have been used to estimate these properties, including approximate methods, rigorous bounding techniques, and numerical methods. In special, the electrical characterizations of ferroelectric and piezoelectric materials have attracted much attention due to their potential application from transducer to dynamic random access memories (DRAMS). In this work we investigated the preparation and the electrical characterization of a new thin organic-inorganic ferroelectric and piezoelectric films based on poly(vinylidene fluoride) - PVDF and nanoparticles of barium titanate - $BaTiO_3$. PVDF-$BaTiO_3$ films were prepared by mixing the polymer and the inorganic material in different 1 :(1-*X*) mass ratios, where *X* on $0.05 \leq x \leq 0.8$. The composite have been investigated with the use of impedance spectroscopy technique in the frequency range from 100 mHz to 32 MHz and from room temperature to 200ºC. The real and imaginary components of the complex impedance of the composite were observed to obey the typical behavior of solid disorder material. In order to understanding the contribution of both phases, the electrical characteristics of the films were analyzed making using of the Bruggemann Effective Medium Approximation (EMA), where the polymer is associated as matrix medium and the inorganic material as host one. It is obtained an increasing of the dielectric constant of the material from around 40 to 160 the addition of $BaTiO_3$, as well the contribution of PVDF and $BaTiO_3$ to the alternating conductivity of the nanocomposite. This work was sponsored by CNPQ and FAPEMIG agencies from Brazil.

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