Preparation and dielectric characterization of PVDF-HFP/GO/PVDF-HFP and PVDF-HFP-BZT-BCT/GO/PVDF-HFP-BZT-BCT stacked structure for storage application

Anila Polai1, Srabani Pattanaik1, Loree Lipsa1, Sabyasachi Parida1\*

1Department of Physics, C.V. Raman Global University, Bhubaneswar,752054, India

Email: [anilapolai05@gmail.com](mailto:anilapolai05@gmail.com), [srabanipattanaik4444@gmail.com](mailto:srabanipattanaik4444@gmail.com), [loree.lipsa00@gmail.com](mailto:loree.lipsa00@gmail.com), [sabyasachiparida023@gmail.com](mailto:sabyasachiparida023@gmail.com)

**Abstract**. PVDF-HFP and PVDF-HFP/BZT-BCT(10%) composite film were prepared by solution casting followed by the hot-pressing technique. These films were stacked with GO to form two sandwich structures, the outer layers containing PVDF-HFP in one and PVDF-HFP/BZT-BCT(10%) in the other. XRD and FTIR were done to confirm the structure and to find the fraction of β-phase of PVDF-HFP and PVDF-HFP/BZT-BCT films. The β-phase were found to be >70%. The morphological characteristics of the stacked structures were studied from both the surface as well as cross-section with the help of SEM. From the dielectric study it is clear that after adding GO both to PVDF-HFP and PVDF-HFP/BZT-BCT in the form of sandwich structures, the dielectric permittivity of the stacked films are comparatively higher than that of the pure polymer film(r=11.4) and well as the composite film(r=12.5), taken individually. These stacked structures having comparatively higher dielectric constant can be used for energy harvesting and storage applications

References:

1. Lin Zhang, Fundamental Study and Development of 0-3 Dielectric Composites with High Dielectric Constant, 2013.
2. Srikanta Moharana, R.N Mahaling, Silver (Ag)-Graphene Oxide (GO) – Poly (vinylidene fluoride-co-hexafluro-propylene)(PVDF-HFP) nanostructured composites with high dielectric constant and low dielectric loss, <http://dx.doi.org/10.1016/j.cplett.2017.05.018>, 2017.
3. Sakti P. Muduli, Sabyasachi Parida, Sasmita Nayak, Sanjeeb K. Rout, Effect of Graphene Oxide loading on ferroelectric and dielectric properties of hot pressed poly(vinylidene fluoride) matrix composite film, 10.1002/pc.25581, journal of Polymer Composite, 2020.
4. Synergistic effect of graphene on dielectric and piezoelectric characterstic of PVDF-(BZT-BCT) composite for energy harvesting applications, 10.1002/pat.5816, journal of Polymer advanced techonologies, 2022.
5. Yue Zhang, Tiandong Zhang, Lizhu Liu, Qingguo Chi, Changhai Zhang, Qingguo Chen,Yang Cui, Xuan Wang, and Qingquan Lei, Sandwich-Structured PVDF-Based Composite Incorporated with Hybrid Fe3O4@BN Nanosheets for Excellent Dielectric Properties and Energy Storage Performance, J. Phys. Chem. C 2018.