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## Preparation and characterization of poly(vinylidene fluoride): A high dielectric performance nano-composite for electrical storage

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### Abstract

We have prepared films of polymer nano-composite (PNC) of poly[vinylidene-fluoride] (PVDF) and bismuth vanadate (BiVO<sub>4</sub>) nanoparticles. The alpha and gamma electro-active phases were detected, and the addition of BiVO<sub>4</sub> drastically increases the formation of the alpha-phase. Addition of BiVO<sub>4</sub> produces up to 98% of electro-active phases. Robust electrostatic interactions arise between charges at the BiVO<sub>4</sub>-surfaces, and differences in electron affinity between CH<sub>2</sub> and CF<sub>2</sub> groups created dielectric dipoles. The addition of BiVO<sub>4</sub> has not only enhanced the formation of the electrically active phases but also makes each dipole in the phase has its specific characteristics for example its own relaxation time. The AC-electrical permittivity showed that the dielectric constant of 10% wt-BiVO<sub>4</sub> nanoparticles in PVDF has a value 44 epsilon(0), which is four times more than the dielectric constant of the as-prepared PVDF films. These data show the importance of these polymers as easy, flexible, and durable energy storage materials. (C) 2016 SA. Published by Elsevier B.V.

### Keywords

**Author Keywords:** BiVO<sub>4</sub>; Poly vinylidene fluoride; Electro-actives phases; Polymer nano composite; High energy-storage materials

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