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Microstructure and Electrical Properties of Green Electrospun PVDF-HFP nanofibers

Currently, Most of the research reported on the preparation of Poly (vinylidene fluoride-hexafluoropropylene) (PVDF-HFP) by using N, N- dimethylformamide (DMF) as a solvent which is considered a cancerogenic substance. However, It is important to consider environmental hazards, toxicity and this research will focus on the use of "green" alternative solvents instead of the solvents. we are interested in dimethyl sulfoxide (DMSO) as a low toxicity solvent and not hazardous. In this research, the mixture solvents of acetone/DMSO which was used as a co-solvent and able to excellent solubilize PVDF-HFP. For the preparation of nanofiber membrane with various ratios of A6D4, A7D3, and A8D2. Afterward, the mixture was mixed with 5-gram PVDF-HFP before the electrospinning process with a specific condition. The final nanofiber films were investigated and characterized the morphology, dielectric, and crystallinity. As a result, the dielectric constant increased with the acetone contents. The maximum dielectric constant is devoted to A6D4 at 10 Hz. The copolymers'structure was modified β-phase by a different solvent which affected dielectric properties. This work is shown that the difference in the solution mixture affects the electrical properties and phase orientation, and thus can be developed in terms of energy storage, Harvard energy, sensors, and Electrocaloric.

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