

## Morphological Investigation of Cellulose Acetate Nanofibrous Membranes

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**Abstract** – In this work, we study the morphological changes in Cellulose Acetate (CA) electrospun nanofibrous membranes (ENMs) as a function of material parameters i.e. composition of the solvent and the concentration of the polymer, and electrospinning process parameters i.e. spinning solution flow rate, tip to collector distance (TCD), voltage field, and electrospinning processing time. In this respect, we have synthesized ten ENM samples using four different polymeric solutions that contained two concentrations at 10 wt.% and 15 wt.% of cellulose acetate as the main polymer and three different volume ratios of N,N-dimethylformamide (DMF) and acetone mixtures (1:0, 1:1, and 2:8) as solvent. The results show that the polymer solution with lower CA concentration forms thinner nanofibers at the same electrospinning process conditions. Moreover, by increasing the volume fraction of the DMF from 20 v/v% to 100 v/v% in the solvent, beads form with high density. We show that the solvent composition plays an important role in the formation of smooth and bead free nanofibrous membrane with high interconnective porosity. Furthermore, the electrospinning parameters imply that they affect the morphology of the ENMs significantly and further optimization of these parameters determines the ultimate morphology and volume fraction of nanofibers.

**Keywords:** Nanofibrous membranes, Nanostructured morphology, Cellulose acetate, Electrospinning