Fabrication and Characterization of PVA/PEO/CB Nanocomposite Films

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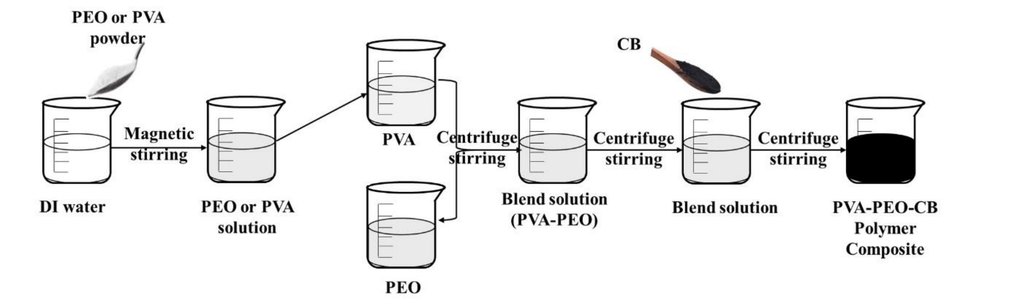
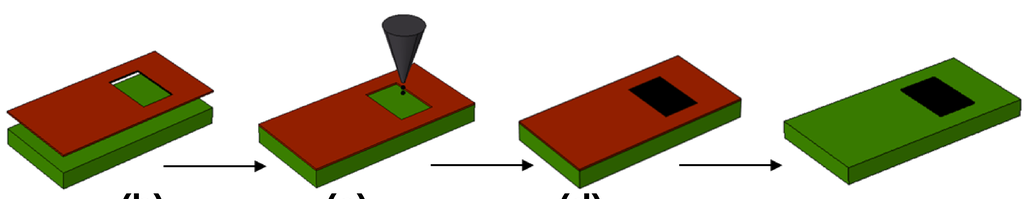
Rationale

- Polymer nanocomposites (PNCs) have recently gained widespread attention as sensing material owing to their intriguing mechanical, electrical and optical properties
- Polymer nanocomposites typically comprise of polymers as a host matrix and nanoparticles as conductive fillers
- Nowadays, instead of using a pristine polymer as a host matrix, multiple polymers are blended to prepare a new host matrix by adapting the useful properties of the pris-tine polymers
- Thus, we present the preparation and characterization of PNC films. The films were prepared from PEO-PVA blends loaded with different concentrations of CBs

Methodology

Schematic illustrating the preparation procedure of PVA-PEO-CB polymer composite



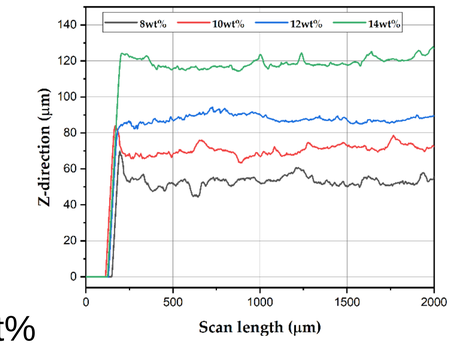


- The conventional stencil-printing technique: (a) Placing of the stencil on the top of the substrate; (b) Pouring of the PNC solutions onto the opening of the stencil; (c) Spreading of the composites using a squeegee; (d) The resulting film obtained after curing.

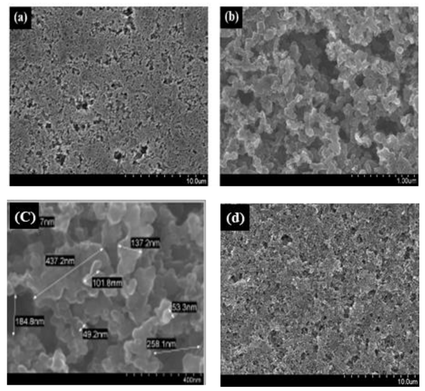
Results

Effect of the weight ratio of PEO-PVA blends

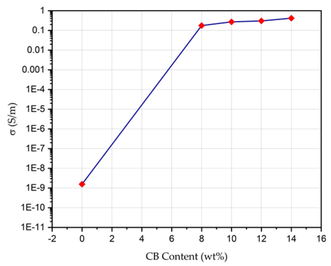
The surface profiles of the PNC films with different wt% of CBs content.



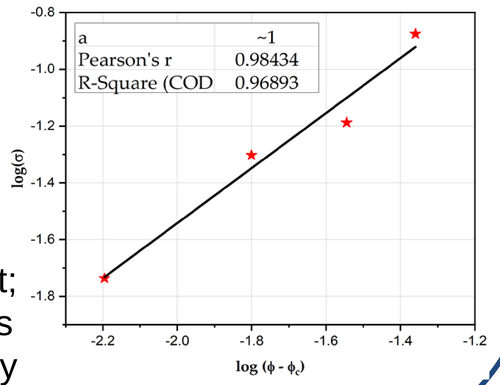
The morphology of the PNC films was studied using the HRSEM



The SEM images of PNC films loaded with: (**a**) 12wt% CB at 10 μm; (**b**) 12wt% CB at 1 μm resolution; (**c**) CB agglomerations; (d) 10wt% CB at 10 μm



Effect of CB content on electrical conductivity: **(a)** The electrical conductivity as a function of CB content; **(b)** The linear fit of the films using the percolation theory



Conclusion

- The PNC films were characterized to obtain the topographical, morphological, and electrical properties
- Effect of creasing and delamination were observed in the PNC films having unequal proportions of PVA and PEO
- The formation of micropores on the surface of PNC films was observed
- The conductivity of the PNC film increases with increase in the wt% of CB