

# A comparative study of structured PVDF fiber/bead composite via electrospinning technique

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## ABSTRACT

In this work, the electrospinning technique is used for the fabrication of functional PVDF fibers in order to identify and evaluate the influence of the experimental conditions on the nanofiber properties in terms of optical transmittance, wettability and surface morphology. According to this, a matrix of 4x4 samples has been successfully developed by controlling two operational input parameters such as the resultant applied voltage (from 10 up to 17.5 KV), and the flow rate (from 800 up to 1400  $\mu\text{L}/\text{h}$ ) for a fixed polymeric precursor concentration (15 wt.%). The experimental results have shown the presence of beads with different shape and size along the electrospun fibers in all the samples of study. The following parameters such as fiber diameter, surface roughness, UV-Vis spectroscopy and water contact angle (WCA) measurements have been deeply analyzed for the optimization of electrospun fiber composite. Finally, on one hand, this study has shown that an increase in the applied voltage has produced a lower light transmittance with the formation of thinner fibers and a lower surface roughness. On the other hand, an increase in the flow rate has produced an increase in the fiber diameter up to a maximum flow rate of 1200  $\mu\text{L}/\text{h}$ , although the surface roughness has continued increased due to the presence of beads, playing a key role in the wettability properties.

## RESULTS AND DISCUSSION

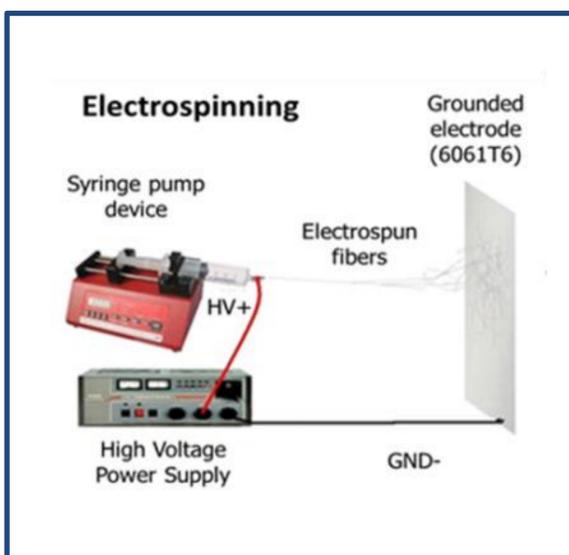


Figure 1: setup experimental for electrospinning process.

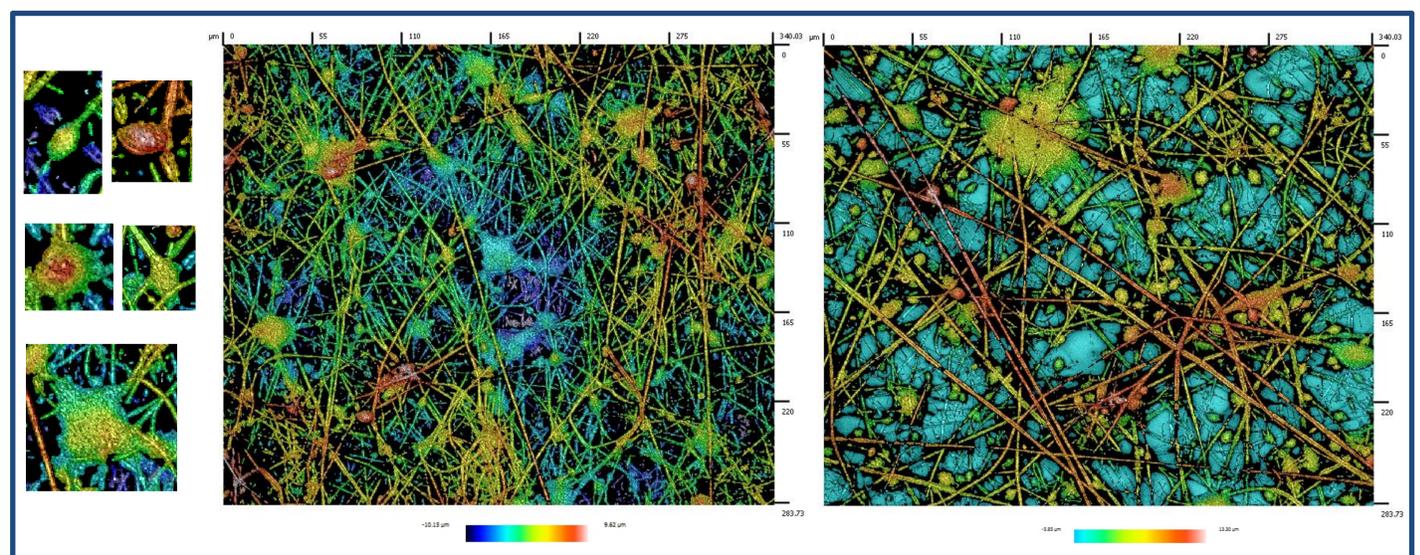


Figure 2: Morphology of the electrospun fibers and beads

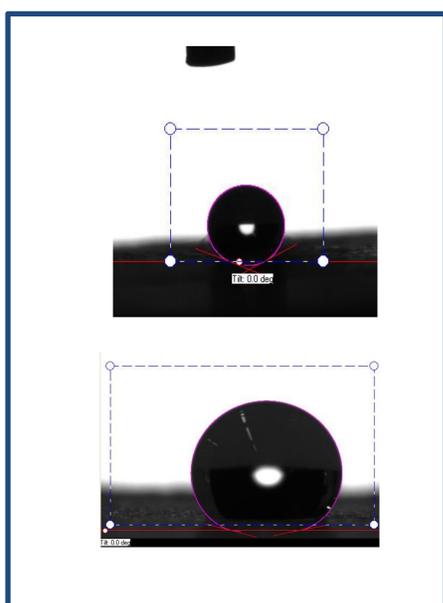


Figure 3: water contact angle (WCA) measurement of the electrospun fibers

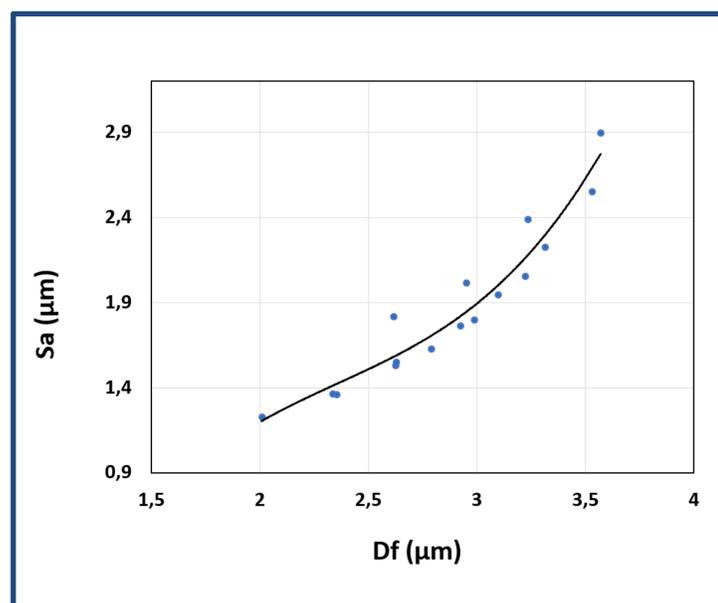


Figure 4: From Linear to exponential relationship between the fiber diameter and the surface roughness due to the influence of beads

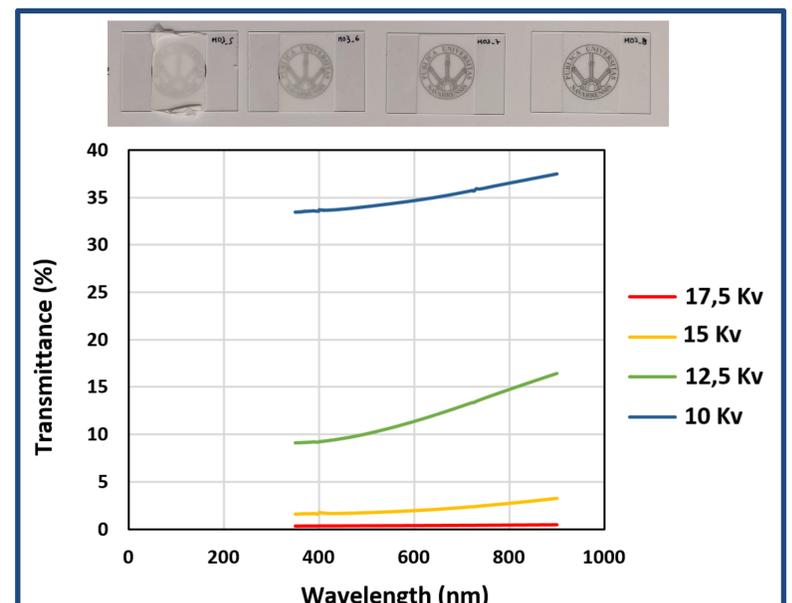


Figure 5: UV-vis spectra of the resultant fibers for a fixed flow rate (1000  $\mu\text{L}/\text{h}$ ) as a function of the applied voltage

## ACKNOWLEDGEMENTS

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## REFERENCES

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