

Composites Based on Nafion and In_2O_3 for Possible Applications in Electrochemical Devices

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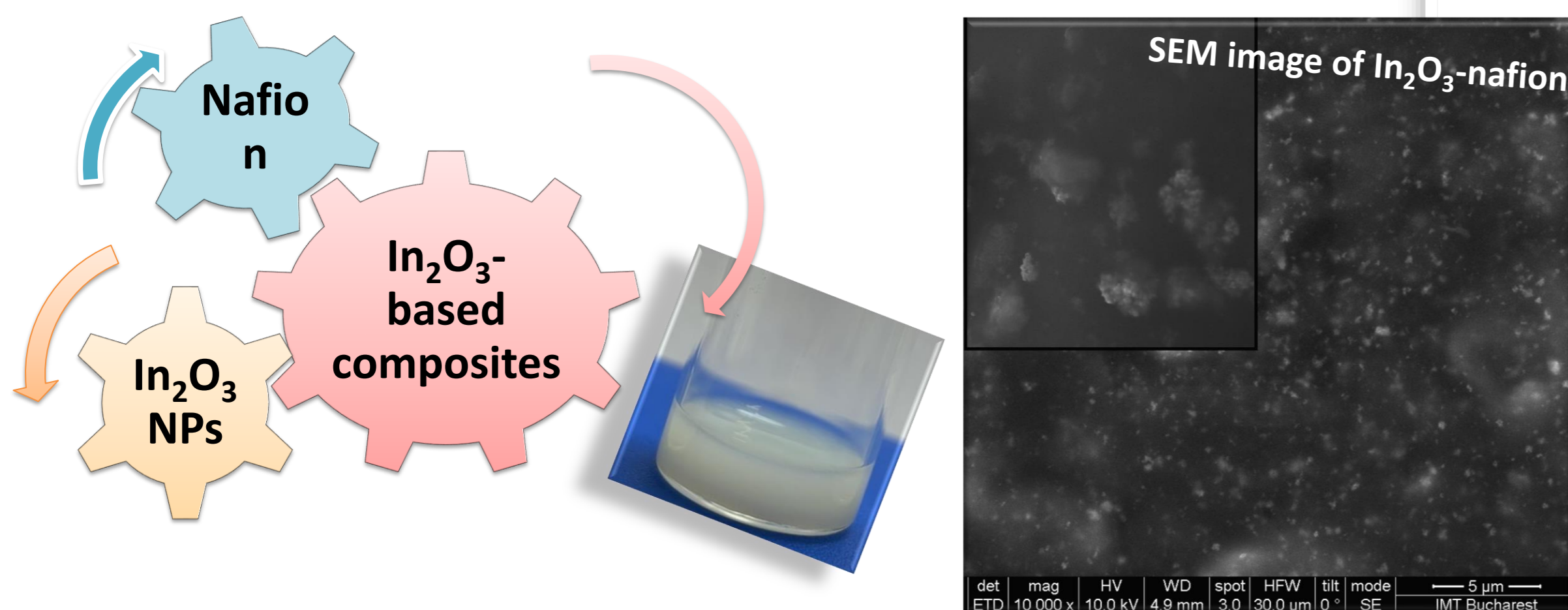
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INTRODUCTION & AIM

The embedding of metal oxide nanoparticles into polymeric matrices creates composite materials with interesting physicochemical properties and potential applications in various fields, such as environmental and food monitoring, optical devices, and biosensors.

In the present paper, In_2O_3 -based composites were prepared by an ex situ method, where In_2O_3 nanostructures were dispersed into a nafion matrix through an ultrasound mixing process, under rigorous control of , etc).

METHOD



CONCLUSION

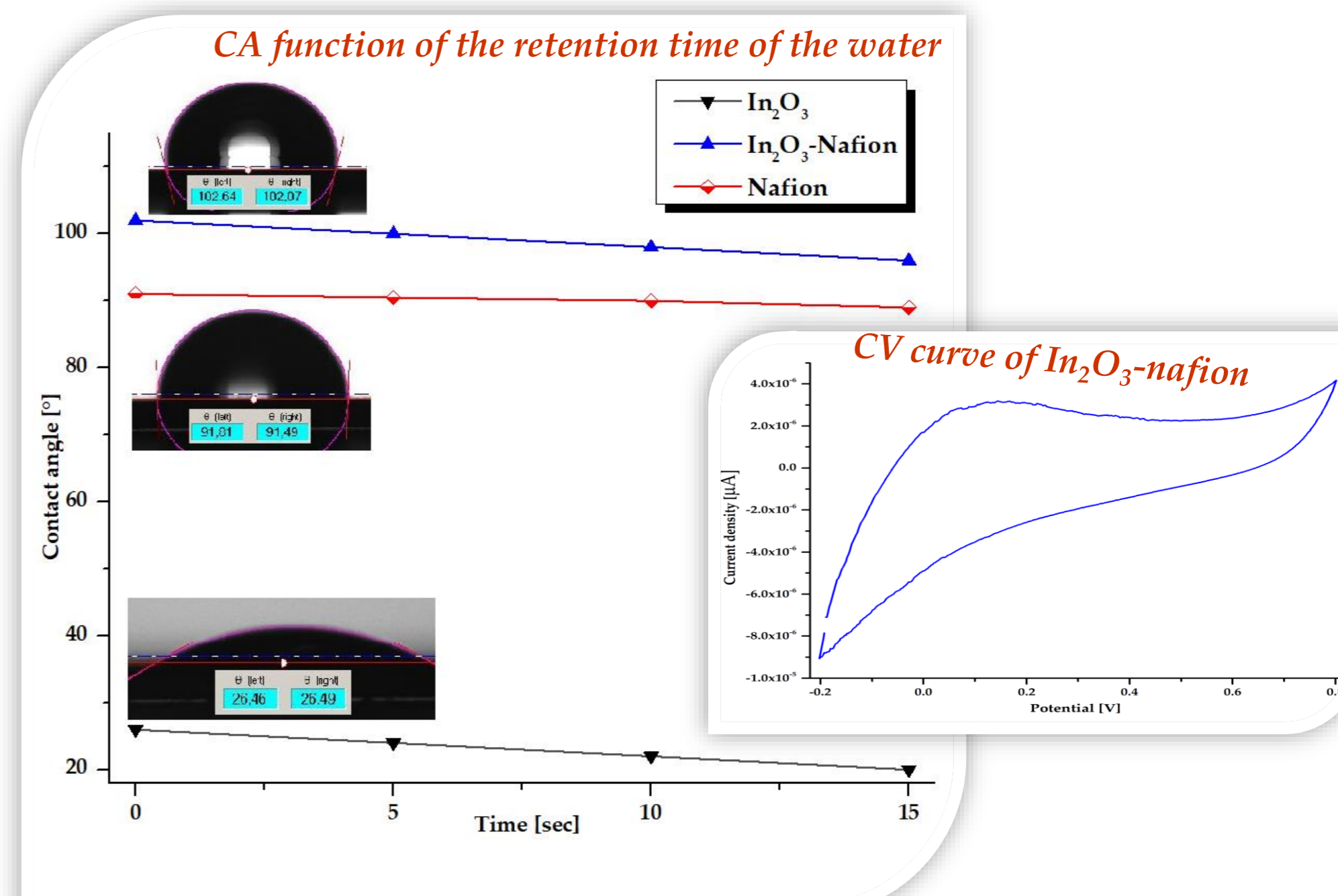
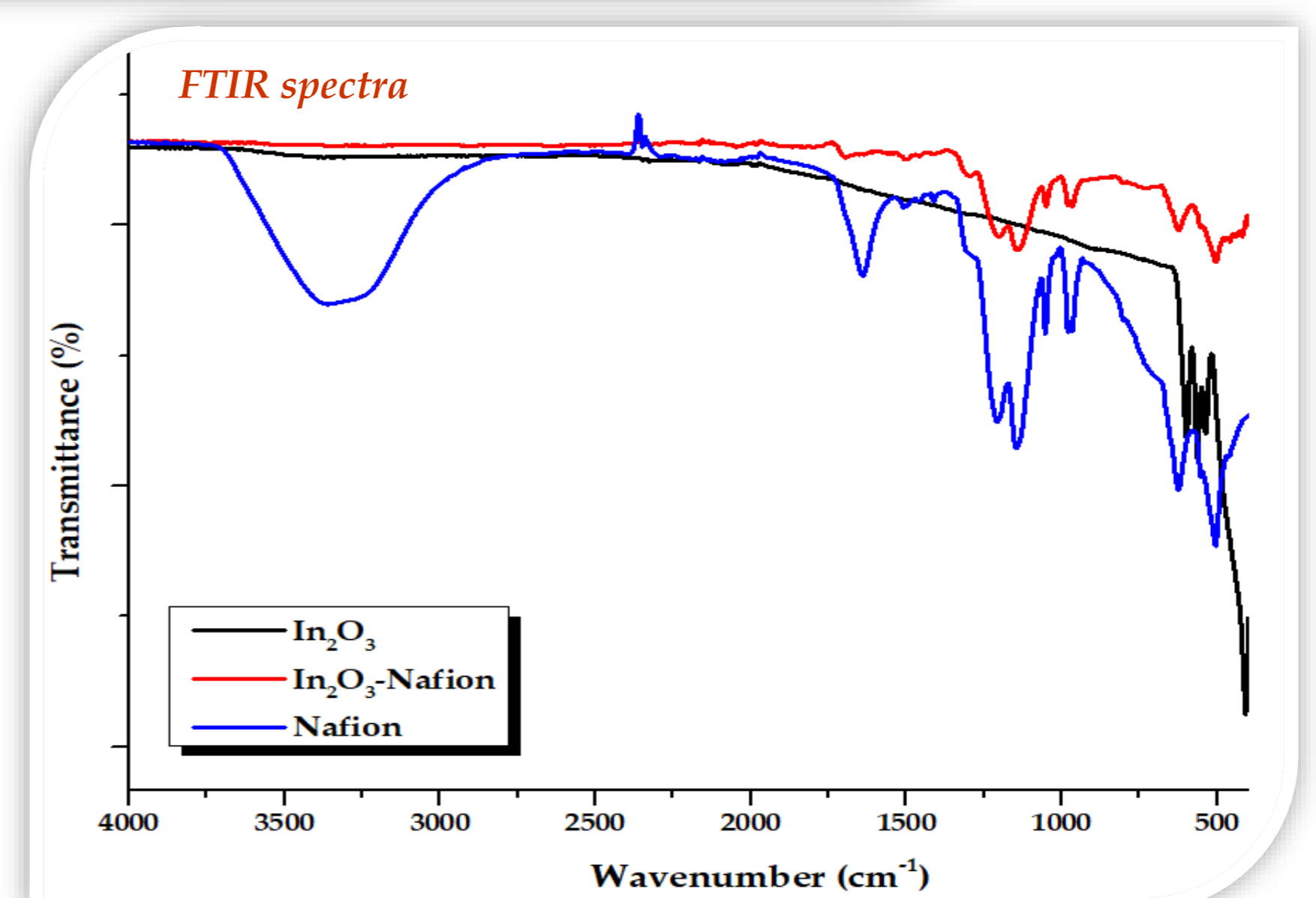
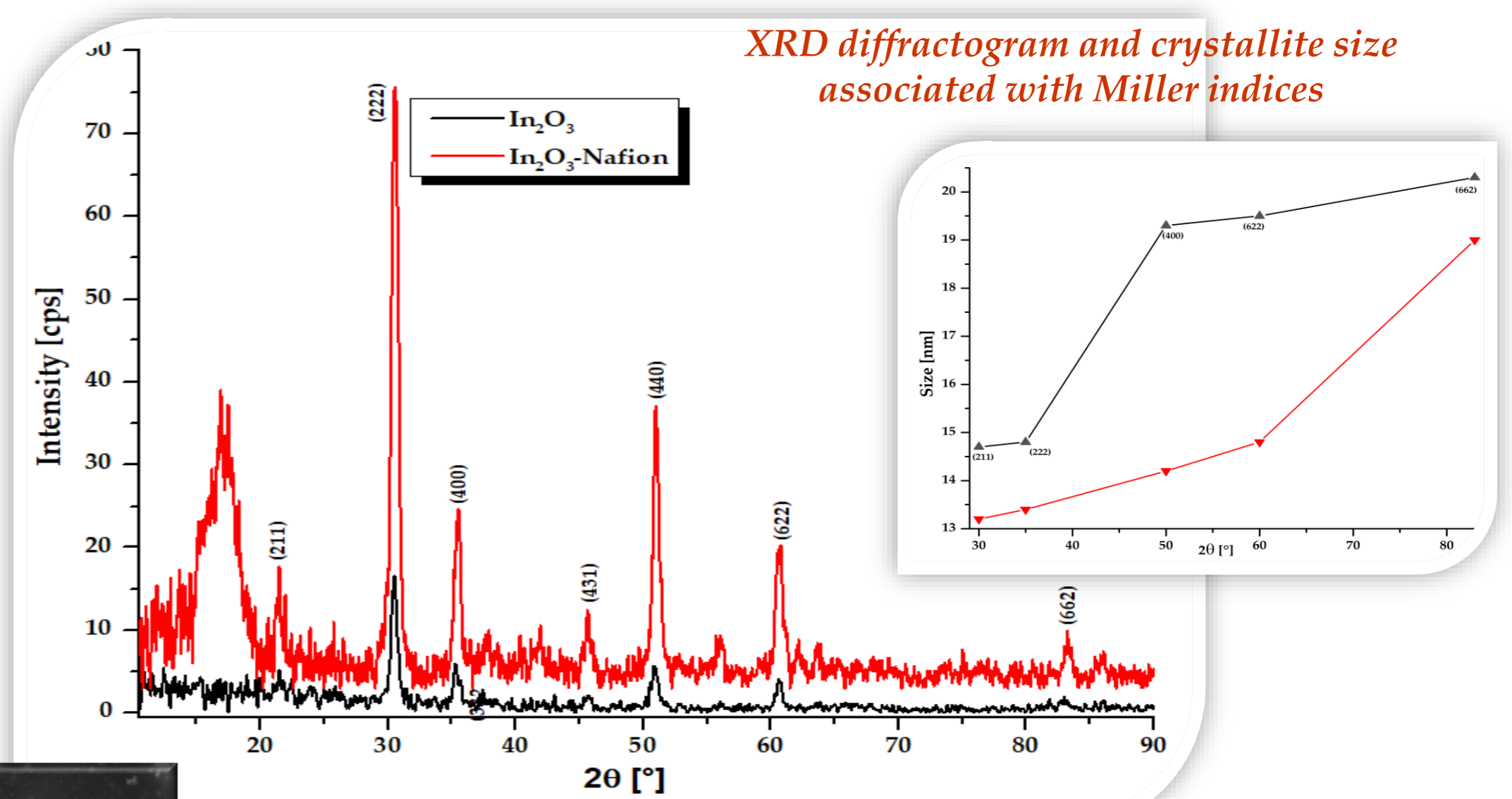
- ❖ The *structural investigation* revealed a slight shift in the characteristic In_2O_3 peaks, indicating a good interaction between the main phase characteristics of the composite.
- ✓ FTIR spectra show bands associated with the vibration mode of the In-O at $\sim 613, 555, 504, 419 \text{ cm}^{-1}$, but also those characteristic of O-H at ~ 3350 și $\sim 1650 \text{ cm}^{-1}$, C-F at $\sim 1210, \sim 1150, \sim 980 \text{ cm}^{-1}$, C-O la $\sim 960 \text{ cm}^{-1}$ and S-O at $\sim 1050 \text{ cm}^{-1}$.
- ✓ The XRD diffractogram shows characteristic In_2O_3 planes at angle of $30.51^\circ, 35.44^\circ, 60.68^\circ$ and 83.1° , with an average crystallite size of 15 nm.
- ❖ *Morphological analysis* showed that the In_2O_3 NPs were uniformly distributed in the matrix, with a slight tendency to agglomerate.
- ❖ The *contact angle* shows a decrease in the hydrophobic character of the In_2O_3 -nafion composite at $\sim 91^\circ$ compared with the angle of the matrix at around 102° .
- ❖ The electrochemical study carried out by *cyclic voltammetry* highlighted an electrocatalytic activity of the composite through the use of In_2O_3 .

This study provides new insights into composite materials and highlights their performance in developing biosensors, focusing on the properties of composite films.

ACKNOWLEDGEMENTS

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RESULTS & DISCUSSION



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