Fabrication of flexible electrically conductive polymer based micro-patterns using plasma discharge

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1. Abstract

Since past few decades a simple, high efficient and economical method for fabrication of **high conducting micro-patterns** for the application in the field of **flexible micro-electronics** has become the focus of interest. A number of novel approaches are implemented to reach the goal, such as nano imprinting [1, 2], micro contact printing [3], dip-pen lithography [4]. In all these techniques, flexible patterns were made up of **polymeric materials** using small quantity of conducting fillers, resulting into limited or low conductivity. A **conductive polymer** represents material, which can be effective used for replacement of traditional materials used in electronics applications, such as metals, because of their excellent **flexible** and **chemical** inertness properties and **low cost**. This work aimed to enhance the **electrical conductivity** of prepared **micro-patterns** by using **silicon mask** and **drop casting** method in combination with **plasma treatment** .

2. Methodology

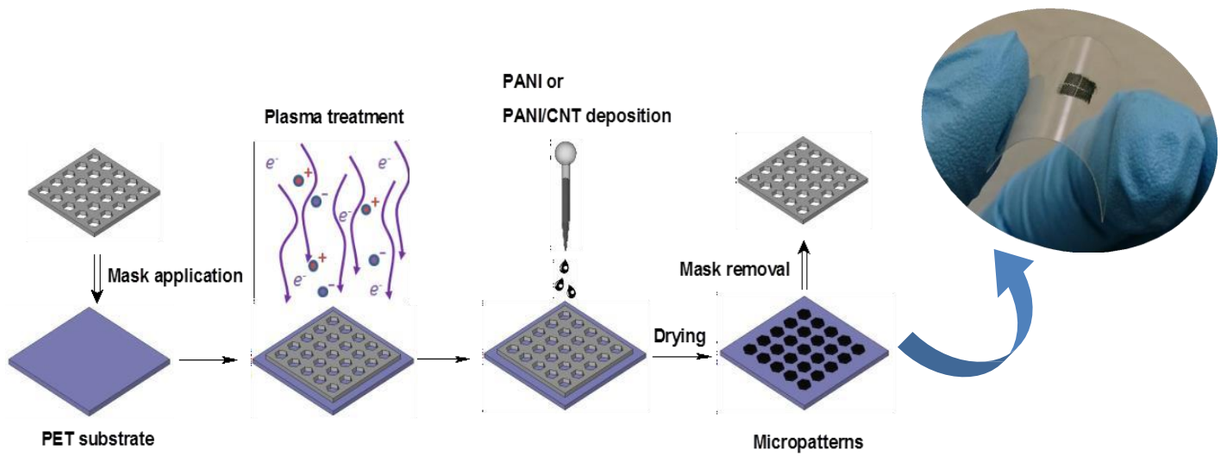
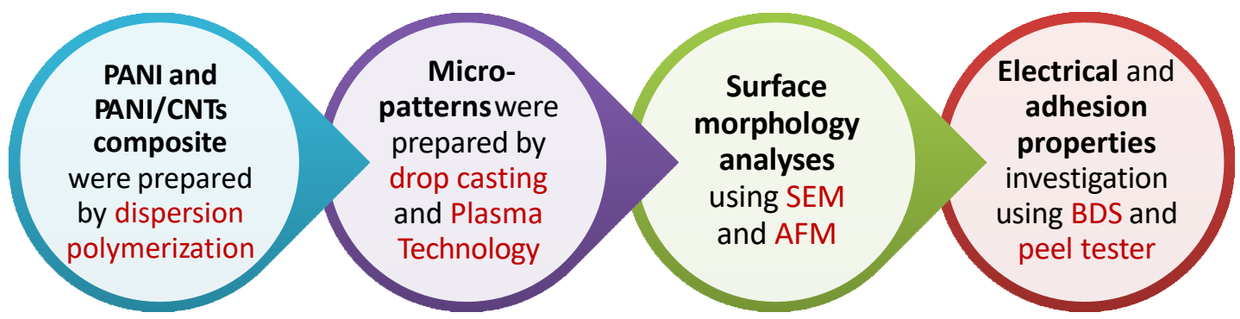


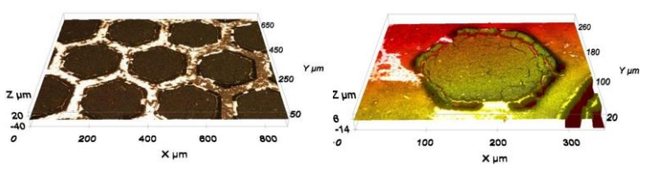
Figure 1: Scheme of micropatterns preparation

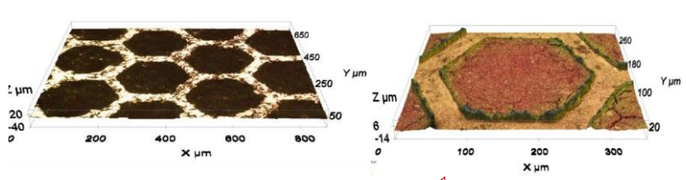


3.Results and Discussion

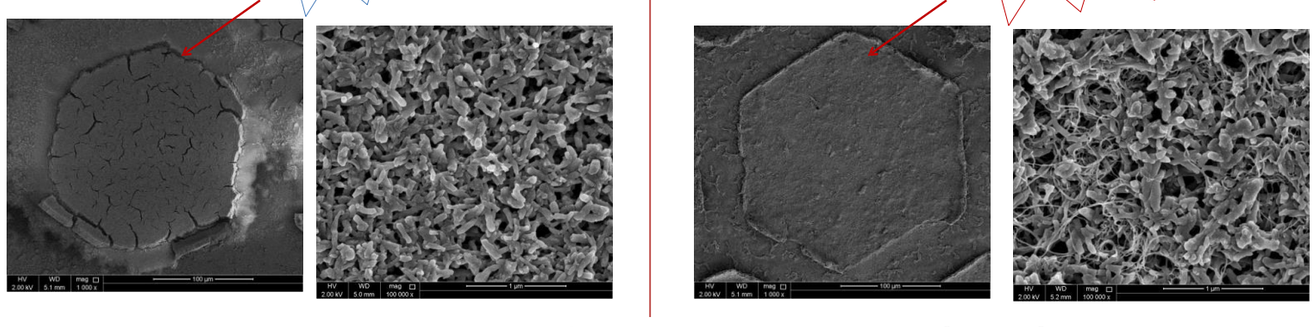
3.1 SURFACE MORPHOLOGY

PANI **PANI/CNT**





Cracks — Profilometry — NO Cracks

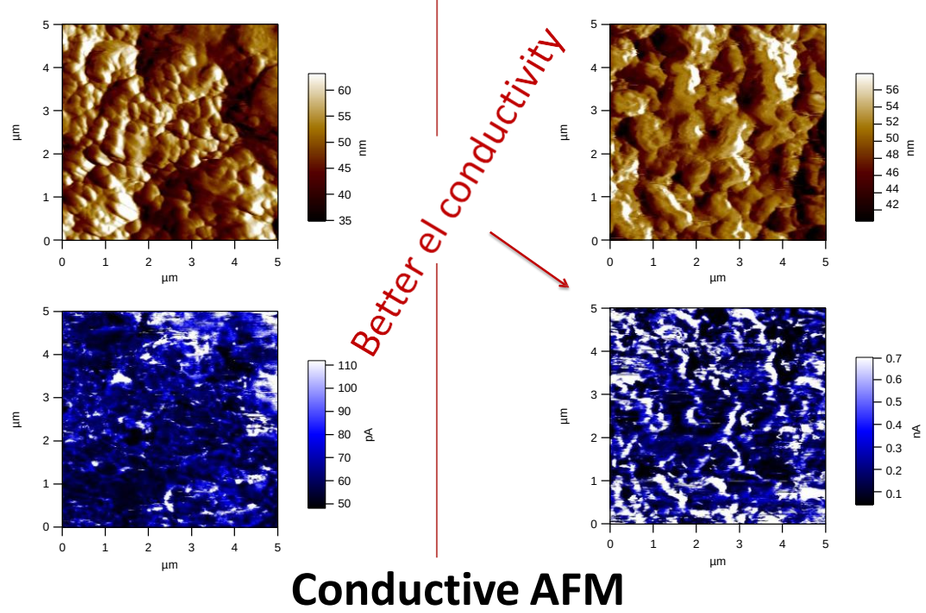


Scanning Electron Microscopy (SEM)

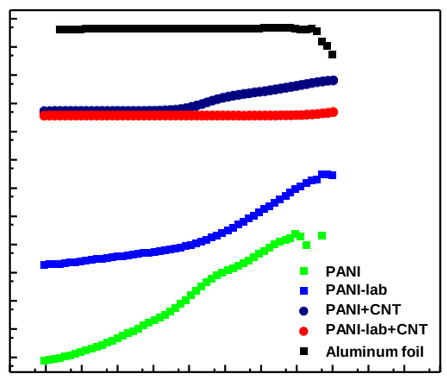
Atomic Force Microscopy (AFM)

3.2 ELECTRICAL CONDUCTIVITY & ADHESION

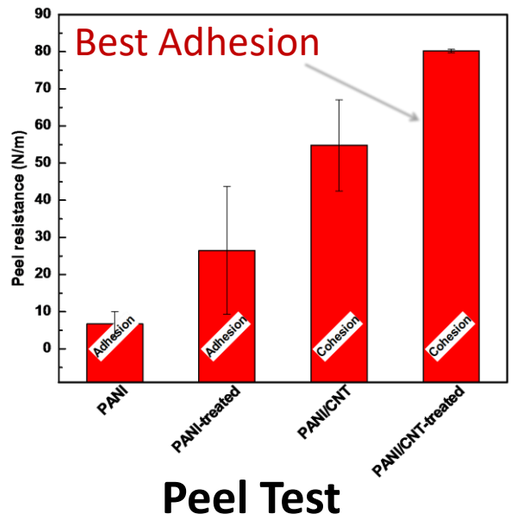
PANI **PANI/CNT**



Conductive AFM



Broad Dielectric Spectroscopy (BDS)



Peel Test

4.Conclusion

- The **PANI** and **PANI-CNT micro-patterns** were fabricated on the **PET** (**flexible substrate**) using **low-temperature plasma** as **adhesion promoter** confirmed by peel test.
- Different microscopic techniques (Profilometry, SEM, AFM) proved the **homogeneous** structures of **micro-patterns**.
- BDS and Conductive AFM confirmed **electrical behavior** of prepared micro-patterns, especially using **PANI-CNT**.

5. References

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6. Acknowledgement

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