MWCNT-BASED INKS OPTIMIZATION FOR TEXTILE SUPERCAPACITORS USING SCREEN PRINTING METHOD

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Introduction

Recently, the demand for intelligent textiles and smart materials is growing enormously in the world motivated by the consumers' and market requests for innovative high-performance products [1]. Electrochemical energy storage systems like supercapacitors (SCs) are promising technologies to develop smart functionalities on textiles, particularly for the area of health and wellness. Carbon-based materials have been incorporated in fabrics to fabricate textile supercapacitors (TSCs) owing to their unique features that make them highly applicable as a SC material [2]. Screen-printing has long been used in the printing industry, with the advantage of being a low-cost and scalable process [1]

Objectives

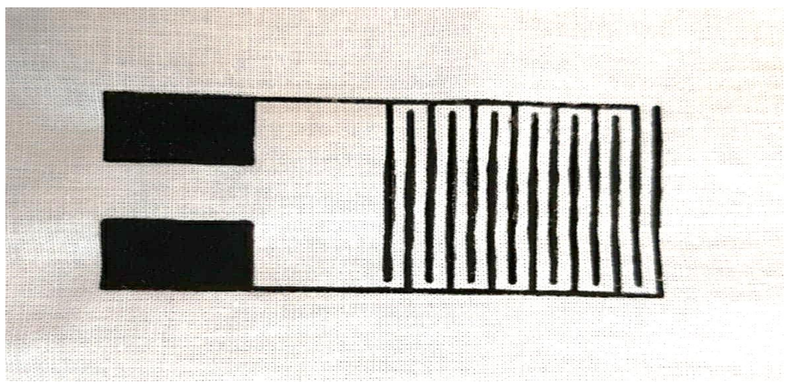
Scalable fabrication of textile supercapacitors (TSCs) using:

- Environmentally-friendly and non-toxic ink
- Optimizied MWCNT-based ink suitable for screen-printing

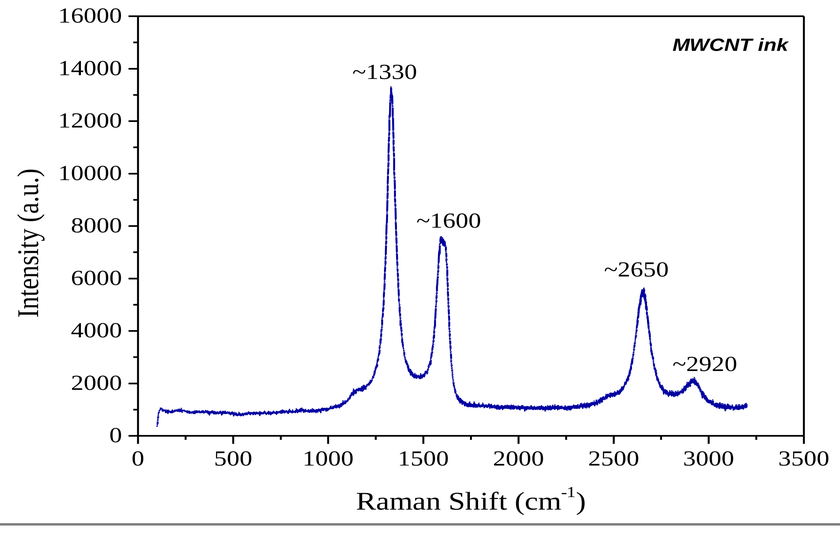
Wearable energy storage supercapacitors

Screen-printed interdigital TSC

Fabricate textile electrode using MWCNT-based ink with screen printing method and produce TSC device by coating PVA/H_3PO_4 as electrolyte on interdigitated part

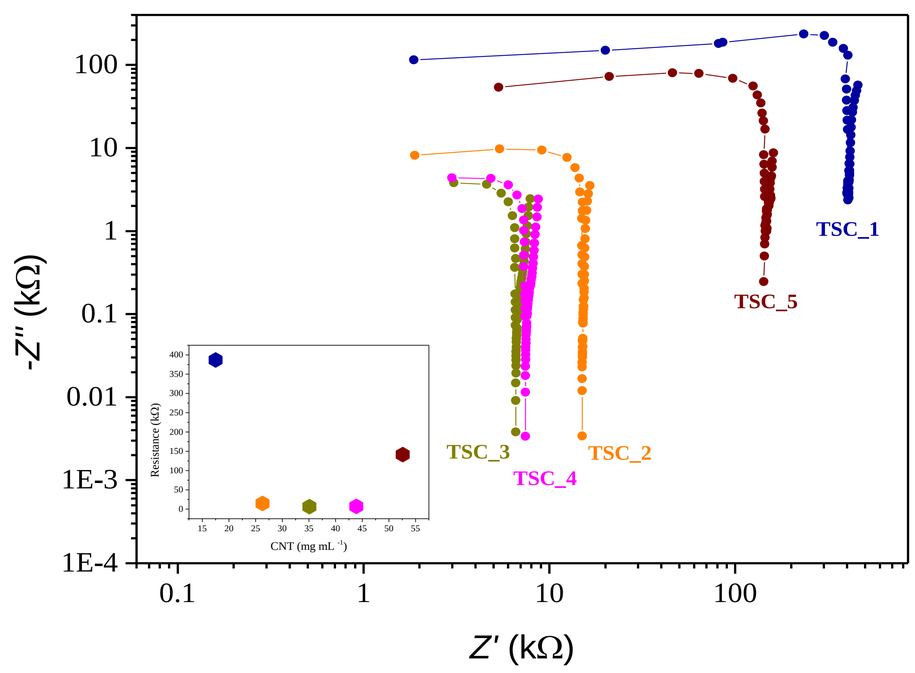


Structural analysis of the CNT-based inks (Raman spectroscopy)

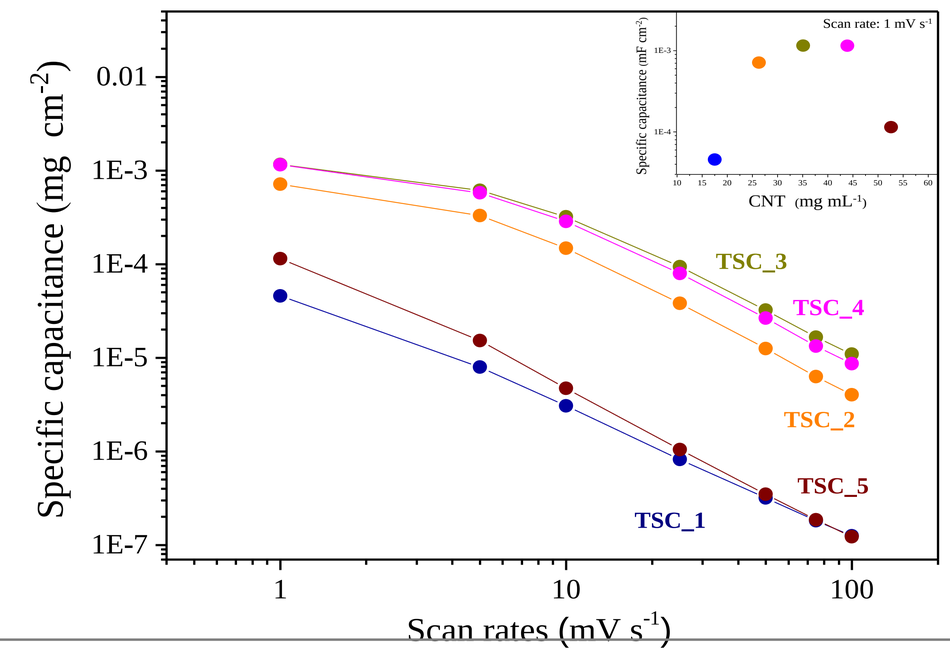


Electrochemical characterization

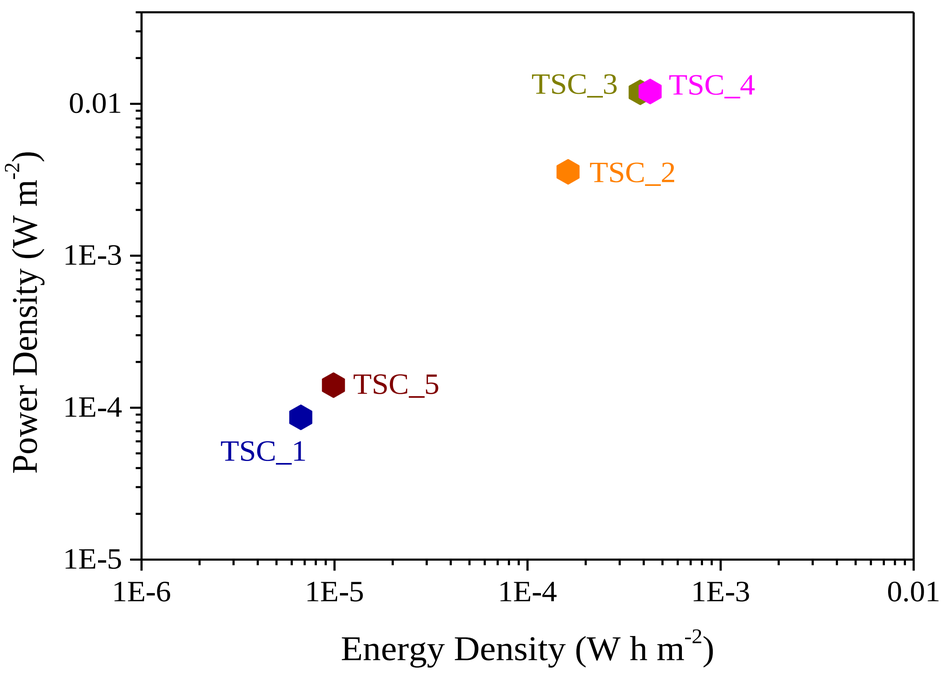
Electrochemical Impedance Spectroscopy (EIS)



Specific capacitance



Conclusions



Analyzing Ragon plot illustrates that TSCs devices with intermediate MWCNT concentration (TSC-3 and TSC_4) has higher power and energy density which are two important parameters for TSCs performance.

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References

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