

Flexible and conductive materials for solar cell applications

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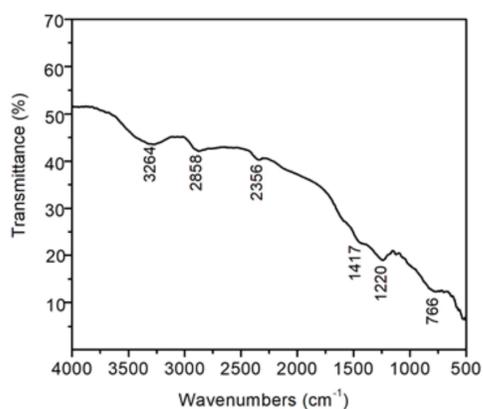
Summary: Two conductive fabrics were obtained by in situ polymerization of aniline on polyester (PES) and cotton substrates. Polyaniline is a conjugate polymer containing aromatic rings and amino groups. The chemical bonds present in polyaniline as C = C double bonds, C-C bonds and N-C bonds participate in conduction by delocalization of electrons. Electrochemical Impedance Spectroscopy (EIS) measurements on coated textiles were performed in order to determine electrical properties appropriate for applications. The structures of coated textiles were determined by Infrared Spectroscopy and their morphologies were investigated by Scanning Electron Microscopy (SEM). Experiments show uniform coating and good electrical properties for both textiles.

Experimental part

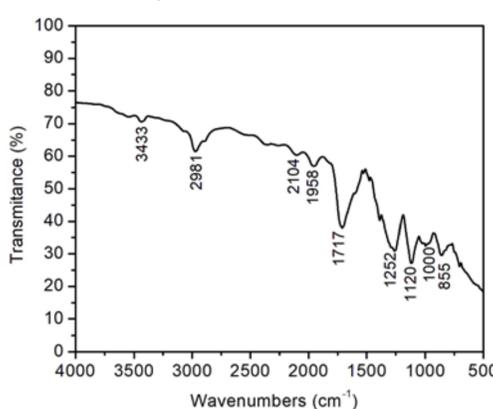
In this article a synthesis method with two dopants used in the same time (hydrochloric acid and sodium dodecyl benzene sulfonate) were followed. The reaction time was 1 hour and 30 minutes. The reaction mass obtained as a dark green solution was placed in the refrigerator at 5°C for 12 hours.

Two types of fabrics were coated by immersion in the resulted solution: one made of polyester, and one made of cotton.

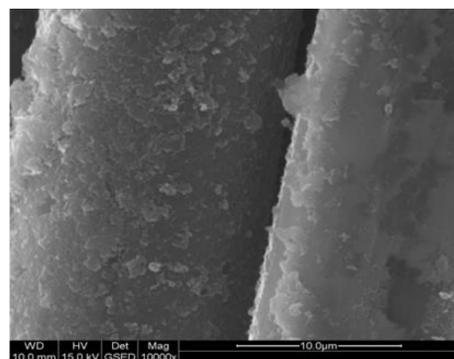
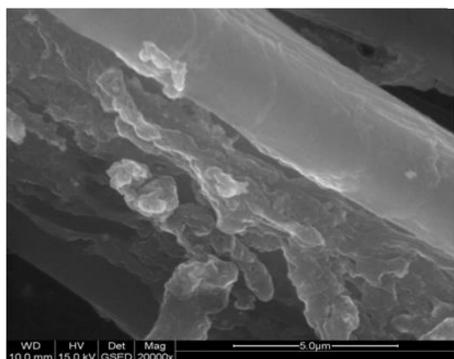
Cotton fabric



Polyester fabric



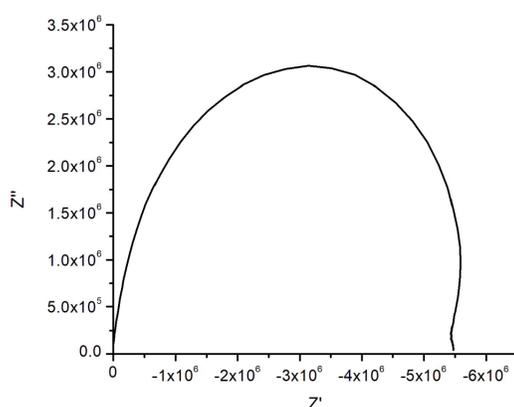
Attenuated total reflectance (ATR)



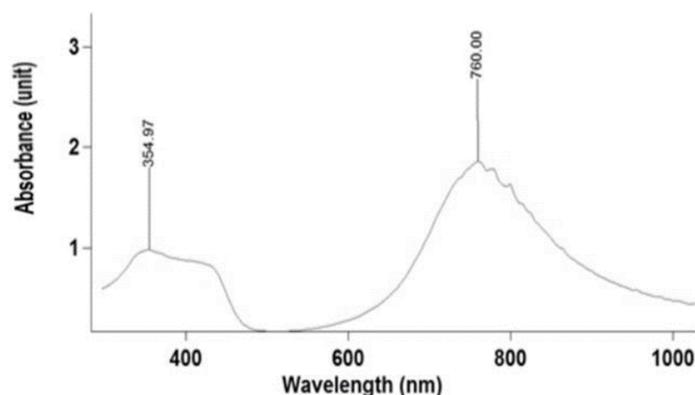
Scanning electron microscopy images (SEM)

Table 2. Resistivity of the coated fabrics according standard SR EN 1149-1:2006

Material	Initial resistivity [Ωcm]	Coated fabric resistivity [Ωcm]
Polyester fabric	$8,3 \cdot 10^{11}$	$4,5 \cdot 10^5$
Cotton fabric	$1,3 \cdot 10^{10}$	$2,1 \cdot 10^5$



Nyquist plot of cotton



UV-VIS spectrum of doped polyaniline

Conclusion

The polyaniline co-doped with hydrochloric acid and sodium dodecyl benzene sulfonate was prepared by chemical oxidation polymerization. Band gap in visible region was calculated at 1.6 eV.

The polyaniline-coated fabrics with electrical properties were obtained.

Cotton fabrics coated with doped polyaniline can be used in the flexible solar cells devices.