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Effect of hydrochloric acid modification on physical and optical properties of PEDOT:PSS thin films

In this work, PEDOT:PSS thin films were prepared on F-doped tin oxide SnO2 substrates by the spin coating method. The films were modified with HCl solution for 2 strategies, including doping and post-treatment. Then, some properties were studied. The X-ray diffraction patterns show only SnO2 peaks. However, the FTIR presented functional groups that corresponded to PEDOT and PSS. Contact angle measurement of water on PEDOT:PSS thin films reveal that contact angle values increase for doping and post-treatment, which implies water resistance improvement. The optical transmittance of PEDOT:PSS films for doping and post-treatment conditions presents high transmittance values above 70%. Sheet resistance measured by a four-point probe measurement demonstrates that sheet resistance values decrease to the minimum values of 6.67 and 6.79 Ω/sq for doping and post-treatment conditions, respectively. It was indicated that the sheet resistance of PEDOT:PSS thin films can be reduced by using HCl for both doping and post-treatment strategies. Thus, this demonstration could be considered as an alternative method for conductive polymer film development.

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