

# Fabrication and characterization of polypyrrole/multi-walled carbon nanotubes thin films using thermal evaporation

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## 2. Experimental



Figure S1. Fabrication and characterization of the thin films [PPy/MWCNTs] by using Physical Vapor Deposition (PVD).

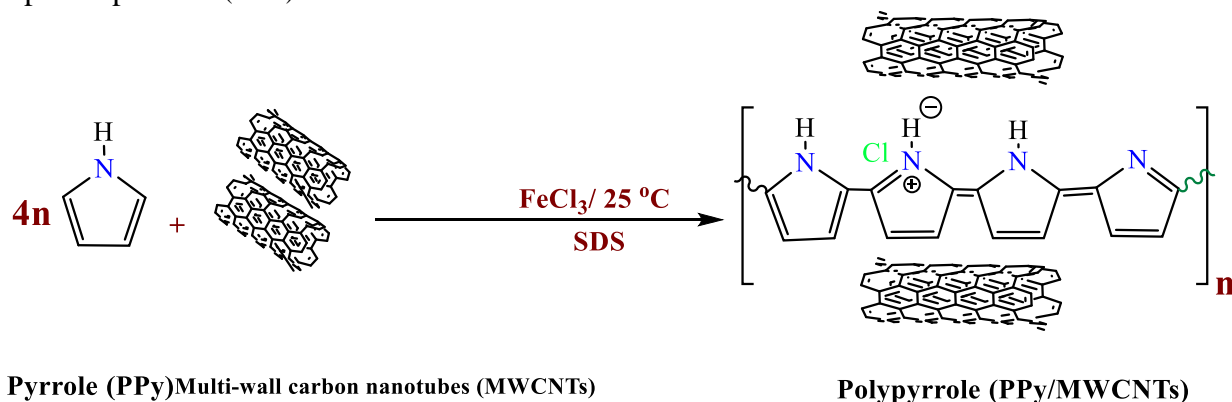


Figure S2. A scheme of pyrrole oxidative polymerization reaction and combination with MWCNTs to the formation of PPy/MWCNTs composites

### 3.1. FT-IR spectroscopy

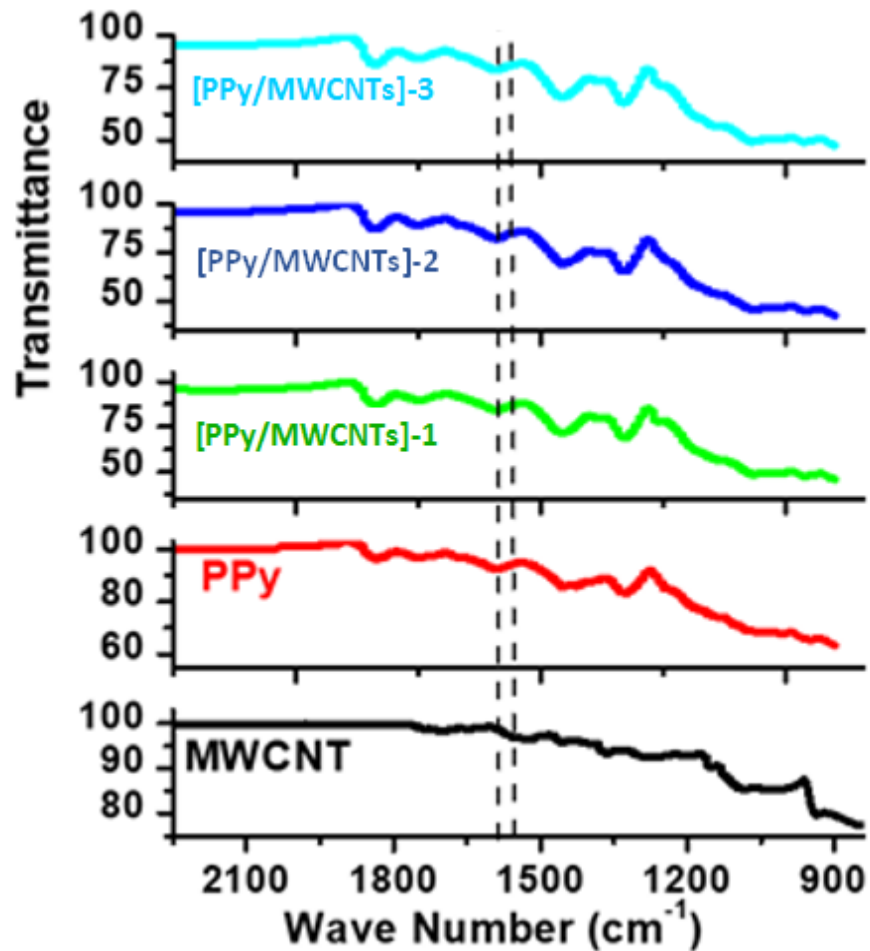


Figure S3. FTIR spectra of the MWCNTs/PPy nanocomposites. Spectra of the pure MWCNTs and PPy are also shown.

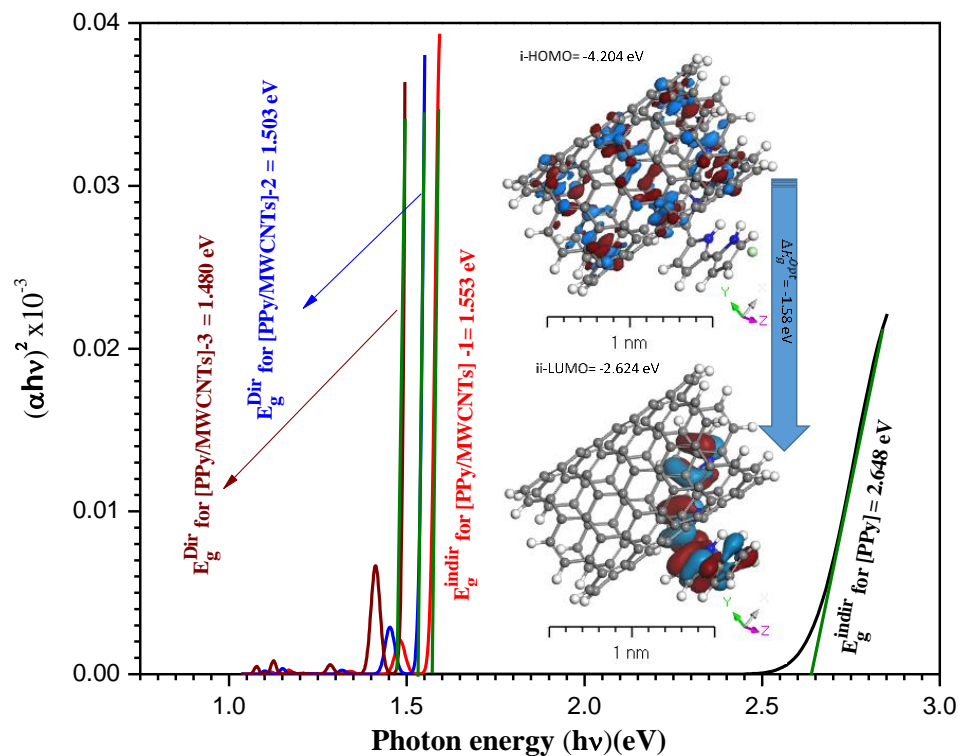
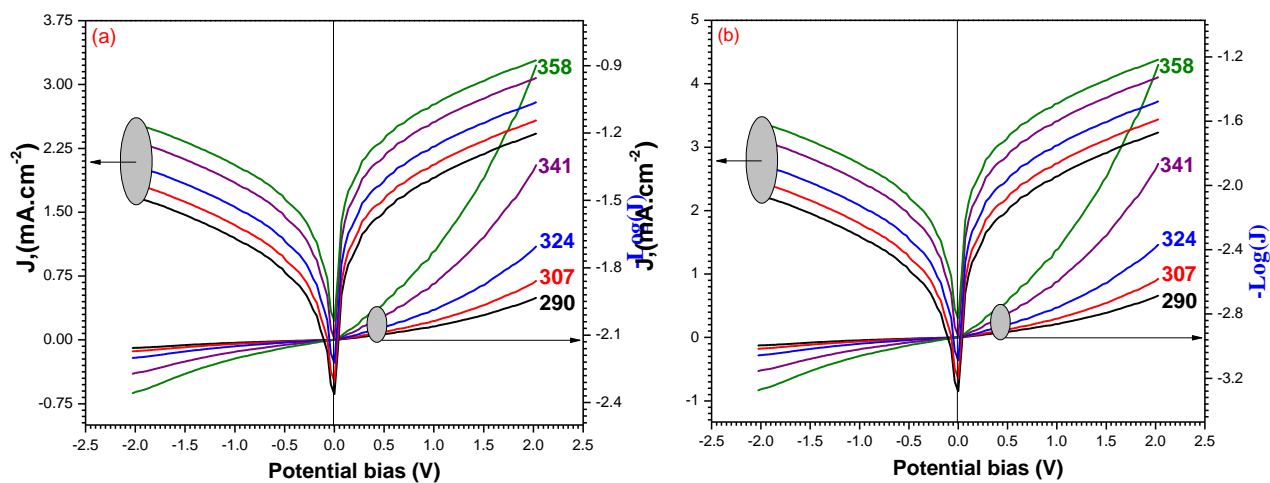


Figure S4. Plot direct  $(\alpha h\nu)^2$  vs photon energy  $(h\nu)$  eV for [PPy/MWCNTs] composites thin film, theoretical calculation HOMO and LUMO for [PPy/MWCNTs] composites gas phase.



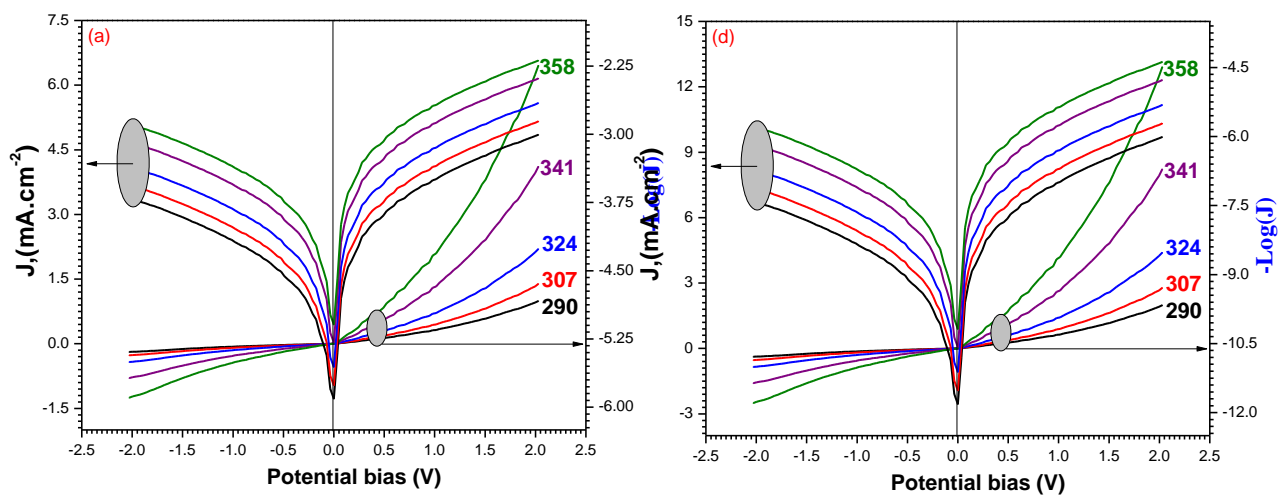


Figure S5. I -V characteristics curves and Log J for a) Au/[PPy]/n-Si/Al; b) Au/[PPy/MWCNTs]-1 composites/n-Si/Al; c) Au/[PPy/MWCNTs]-2 composites/n-Si/Al and d) Au/[PPy/MWCNTs]-3 composites/n-Si/Al heterojunction diode