

Supporting Information

Modified PEDOT by preparing N-doped reduced graphene oxide as potential bio-electrode coating material

Mengmeng Fan^a, Chunlin Zhu^a, Lin Liu^a, Qilu Wu^a, Qingli Hao^b, Jiazhi Yang^a,

Dongping Sun^{a}*

^a Chemicobiology and Functional Materials Institute of Nanjing University of Science and Technology, Xiao Ling Wei 200, Nanjing, 210094, China. Fax: 86-25-84431939; Tel: 86-25-84315079; E-mail: sundpe301@163.com

^b Key Laboratory for Soft Chemistry and Functional Materials of Ministry Education, Nanjing University of Science and Technology, Xiao Ling Wei 200, Nanjing, Jiangsu, 210094, China.

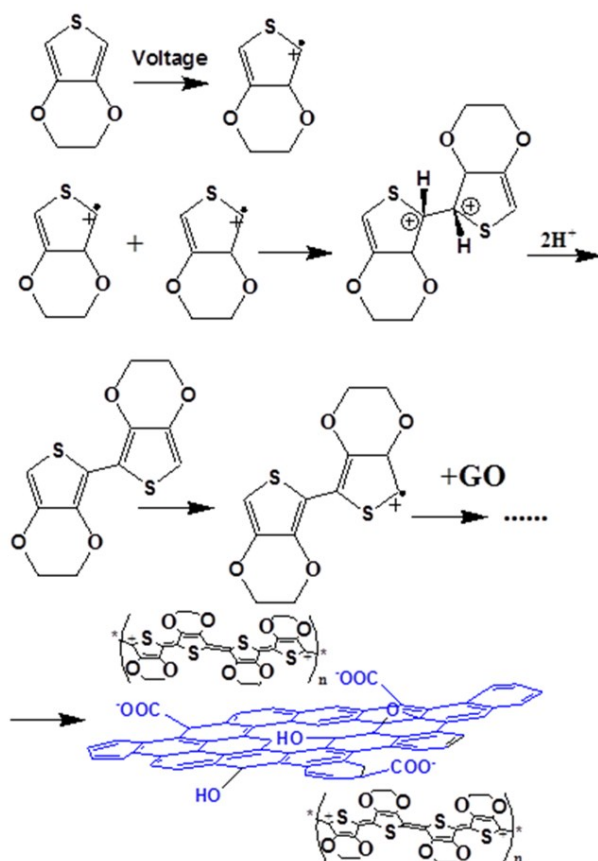


Fig. S1 the polymerization mechanism of PEDOT/GO

The monomer ethylenedioxythiophene (EDOT) was electrochemically oxidized to form small conducting polymer chains firstly. Then positively charged PEDOT chains was combined by ionic bonds, with negative groups by GO.¹

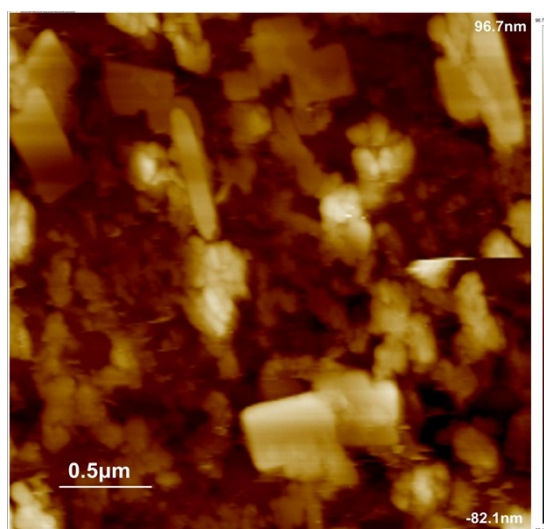


Fig. S2 AFM image of blank PEDOT

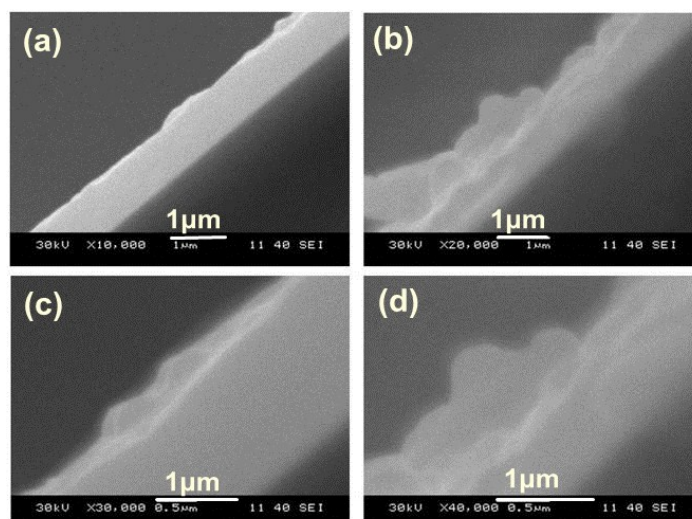


Fig. S3 SEM images of cross section for blank PEDOT (a, c) or PEDOT/N-rGO (b, d) on a gold chip

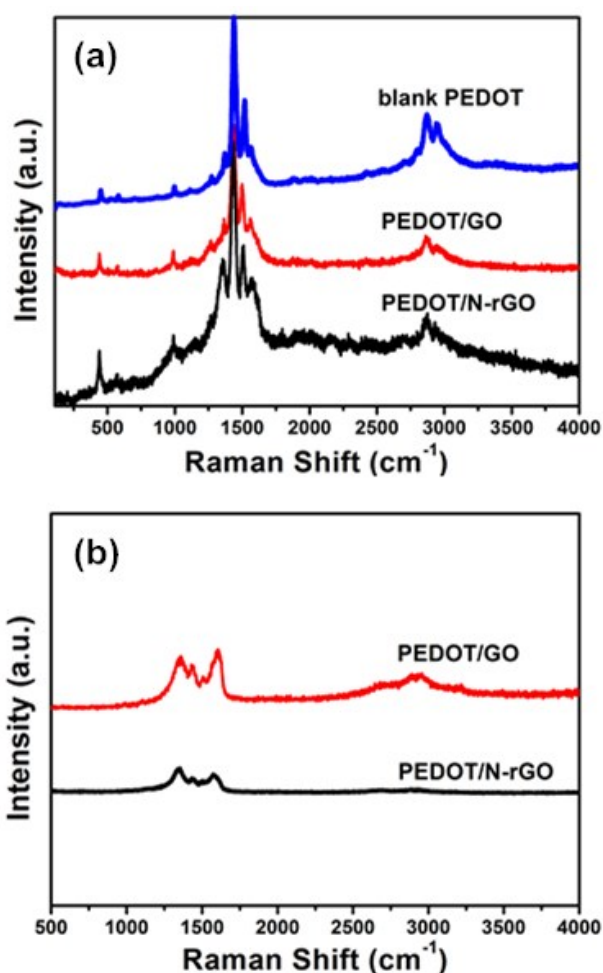


Fig. S4 Raman spectrums of blank PEDOT, PEDOT/GO and PEDOT/ N-rGO: the area covered with polymer (a), the area covered with GO and N-rGO(b)

As shown in the **Fig. S4**, the three spectrums have the same characteristic peaks of PEDOT from 1000 to 2000 cm^{-1} (**Fig. S4a**).² Namely, the peaks at 1510, 1433, 1365,

1267 and 998 cm^{-1} can be assigned to asymmetrical $\text{C}_\alpha=\text{C}_\beta$ stretching, symmetrical $\text{C}_\alpha=\text{C}_\beta$ stretching, $\text{C}_\alpha-\text{C}_\beta$ stretching, $\text{C}_\alpha-\text{C}_\alpha$ (inter-ring) stretching or C-H bending, and ring deformation, respectively,³ which indicated that the properties of PEDOT did not change after modification. Furthermore, compared to PEDOT/GO, the intensity of D and G peaks of PEDOT/N-rGO decreased and the I_D/I_G ratio of PEDOT/N-rGO decreased to 1.33 from 1.46 of PEDOT/GO, which indicated GO was reduced effectively (**Fig. S4b**) and restoration of sp^2 carbons in graphene.⁴

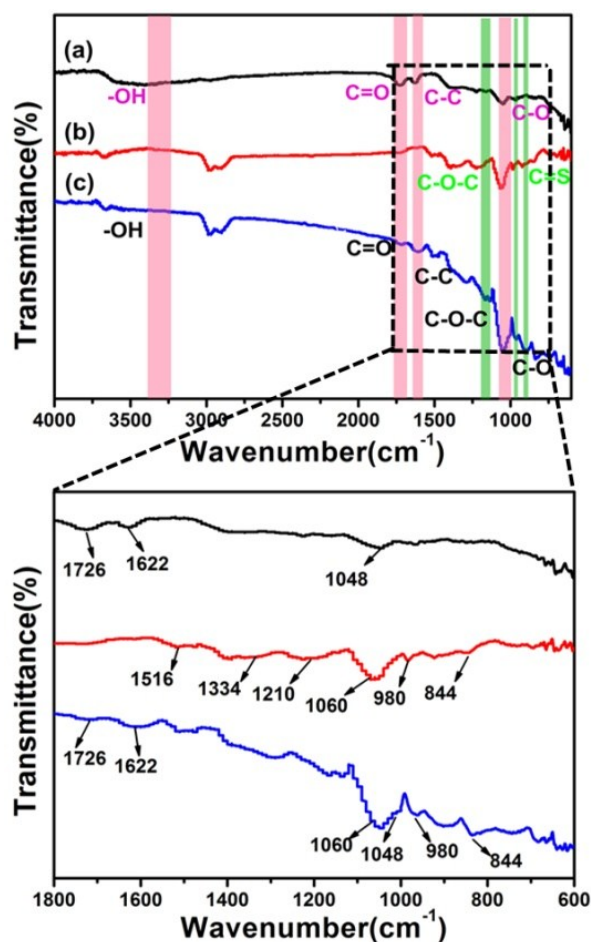


Fig. S5 FT-IR spectrums of a=GO (pink font), b=blank PEDOT (green font) and c=PEDOT/N-rGO (black font). The characteristic peaks of GO and blank PEDOT are labeled by pink and green bands, respectively. The spectrum from 600 to 1800 cm^{-1} was enlarged.

The analysis of functional groups is necessary to demonstrate the successful doping of N-rGO. As shown in **Fig. S5**, the four main peaks of GO at 1048,

1622, 1726 and 3270 cm^{-1} can be assigned to C–O, C=C, C=O and –OH, respectively.⁵ For blank PEDOT (**Fig. S5b**), the peaks at 980, 844 cm^{-1} are assigned to the C=S stretching vibrations,⁶ and the peaks at around 1210 and 1060 cm^{-1} correspond to the stretching of C–O–C bond in the ethylene di-oxy group.⁷ The C=C and C–C of thiophene at stretching vibration peaks locate at 1516 and 1334 cm^{-1} , respectively.^{1, 8} However, besides having homologous characteristic peaks of PEDOT,⁸ there are many new peaks appeared for PEDOT/N-rGO (**Fig. S5c**) including C=C, C=O, C–O stemming from N-rGO (**Fig. S5**, enlarged region), which indicates bond formation between two components (PEDOT and N-rGO).

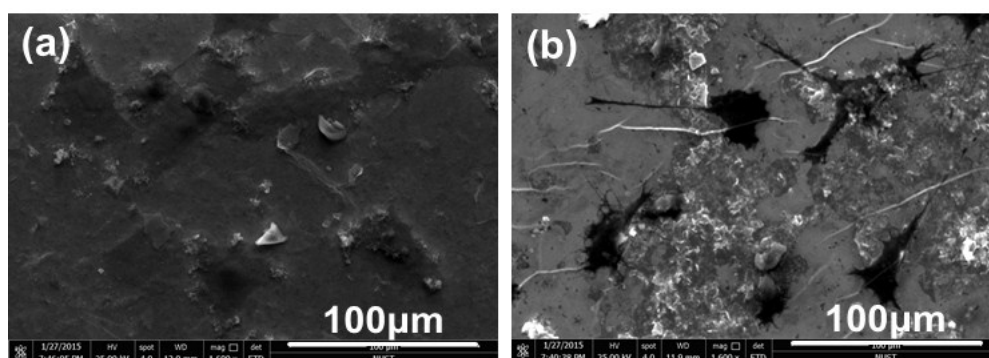


Fig. S6 FE-SEM images of HUVECs cultured for 72 h: PEDOT/N-rGO (a),
PEDOT/H-rGO (b)

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