Supporting Information

Combinatorial non-covalent assembly of graphene oxide and chromophores into hybrid nanofilms for organic electronics

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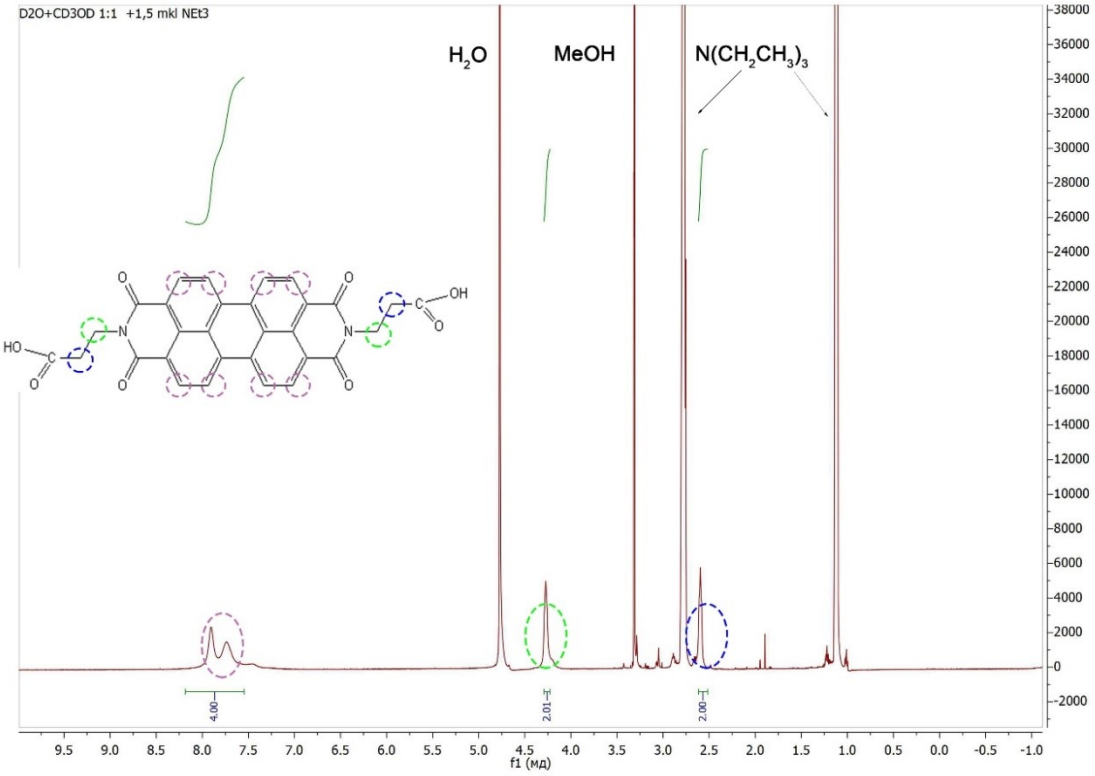

Figure S1. ^{1}H NMR spectra of PDI-PA in a mixture of CD_3OD/D_2O (1:1) in the presence of 1.5 µL of $N(Et)_3$.

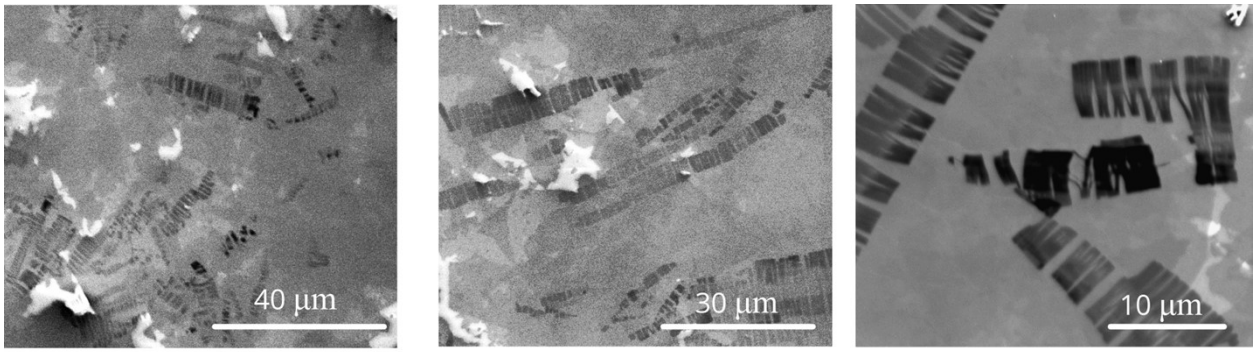

Figure S2. SEM microphotographs of GO/M^{2+}/PDA hybrid coatings obtained at different magnifications. Hybrid materials GO/M^{2+}/PDA and GO/M^{2+}/PDI-PA/M^{2+}/PDA have a similar morphology. The differences can be assessed only by AFM.

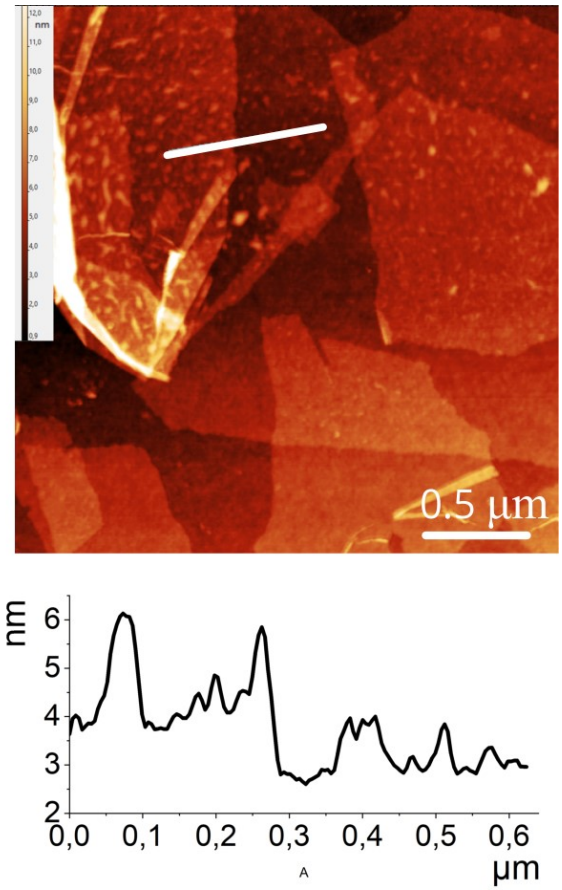

Figure S3. AFM image and corresponding surface profile for GO/Co^{2+}/PDI-PA hybrid nanofilm.

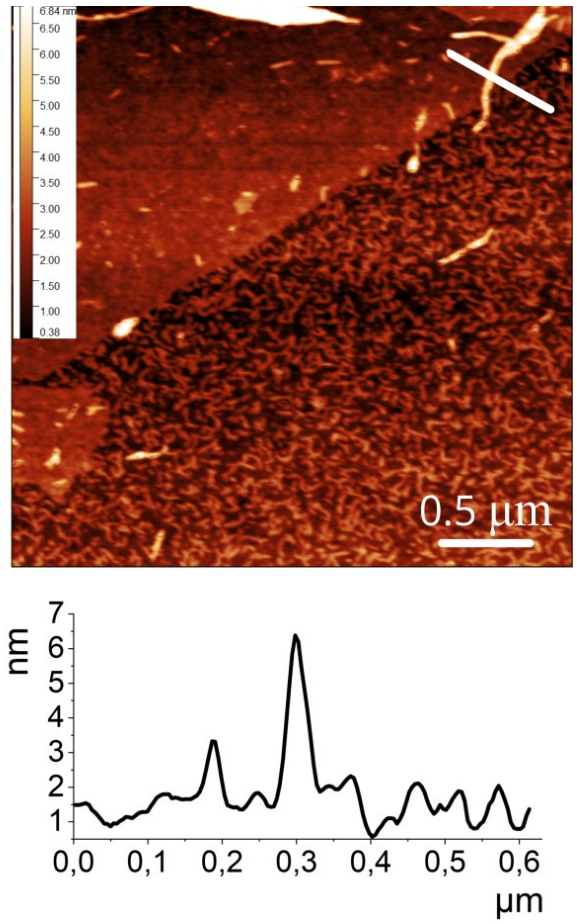

Figure S4. AFM image and corresponding surface profile for GO/Zn^{2+}/PDI-PA hybrid nanofilm.

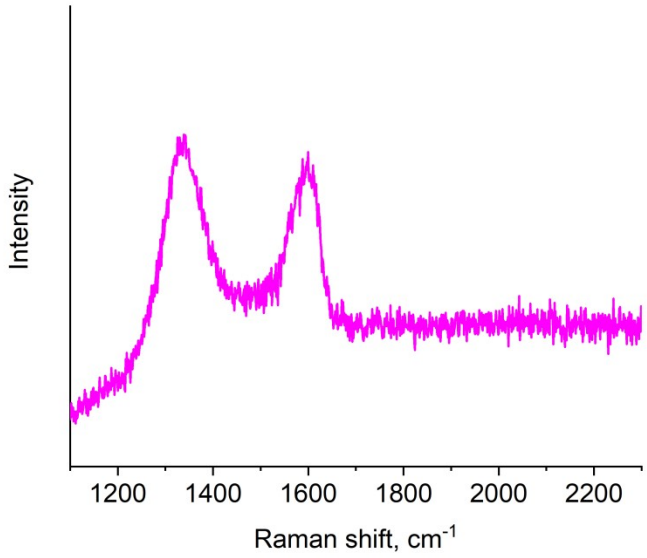

Figure S5. Raman spectrum of metal-free GO/PDI-PA film.

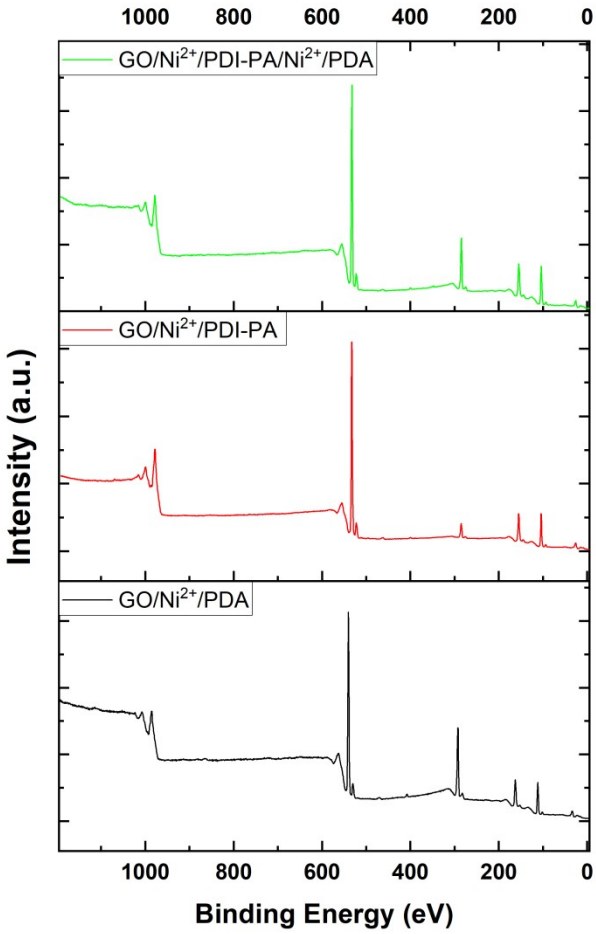

Figure S6. Overview XPS spectra of GO/Ni^{2+}/PDA, GO/Ni^{2+}/PDI-PA and GO/Ni^{2+}/PDI-PA/Ni^{2+}/PDA hybrid materials.

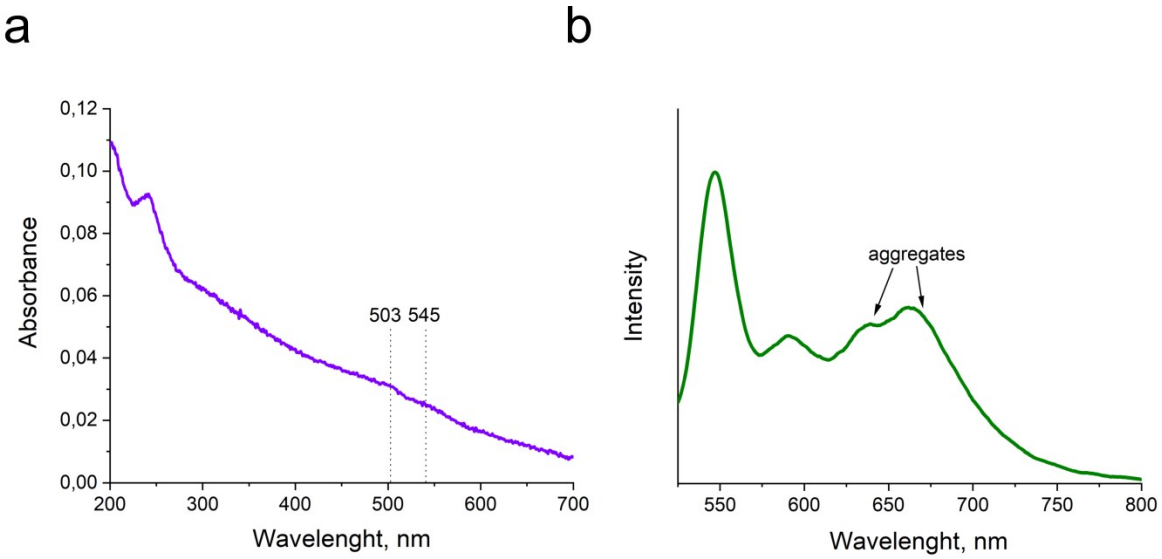

Figure S7. a) UV–vis spectrum and b) fluorescence spectrum of GO/Co^{2+}/PDI-PA film.

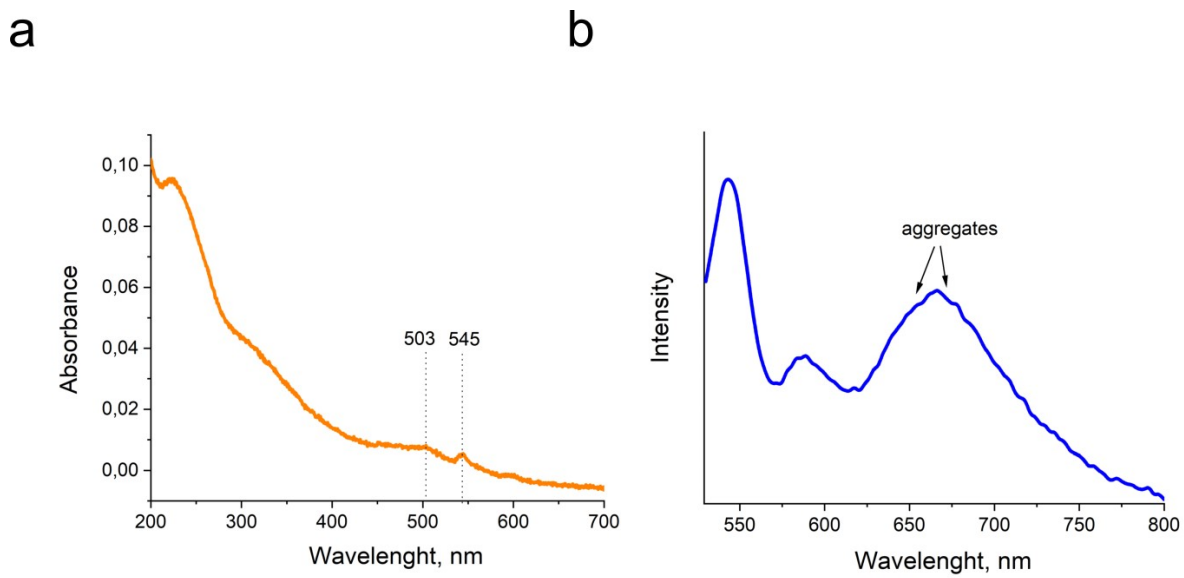

Figure S8. a) UV–vis spectrum and b) fluorescence spectrum of GO/Zn^{2+}/PDI-PA film.

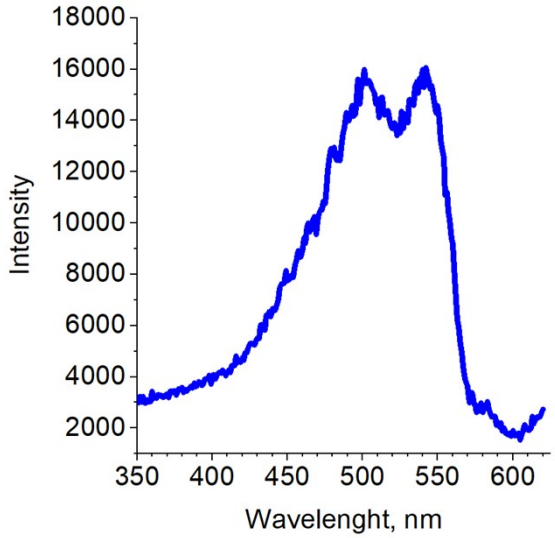

Figure S9. Excitation spectrum of PDA film, crystallized in the «red» form. λ_{em}=640 nm.

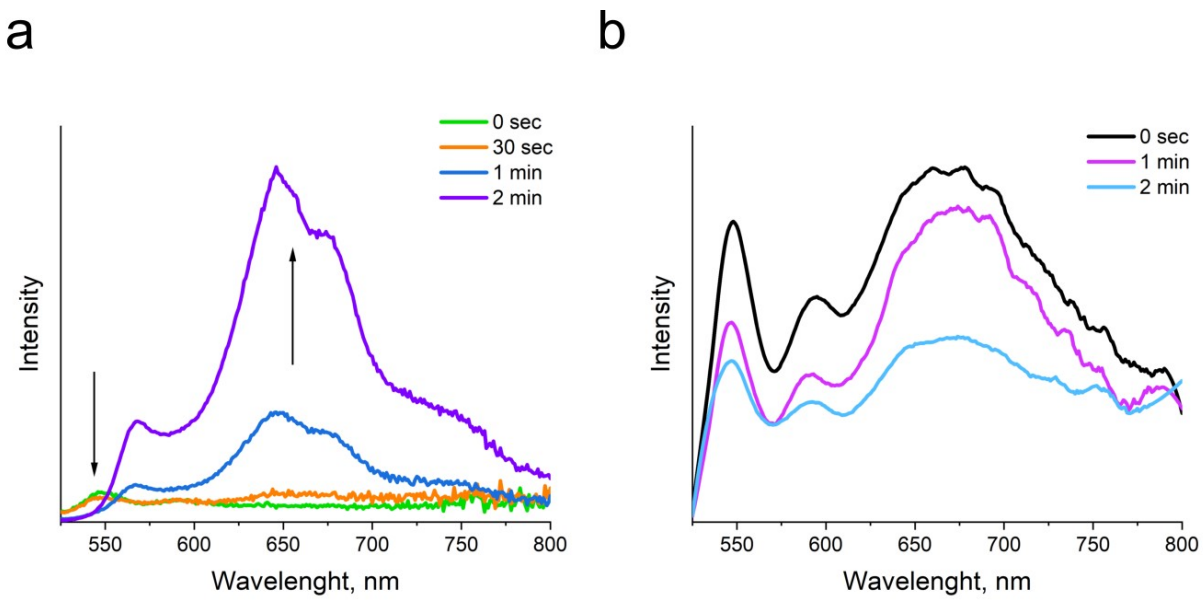

Figure S10. Fluorescence spectra of a) GO/Ni^{2+}/PDI-PA/PDA and b) GO/$Ni^{2+}(OAc)_2$/PDI-PA/$Ni^{2+}(OAc)_2$/PDA hybrid films recorded after 0 sec; 30 sec; 1 min and 2 min of the UV irradiation onset.

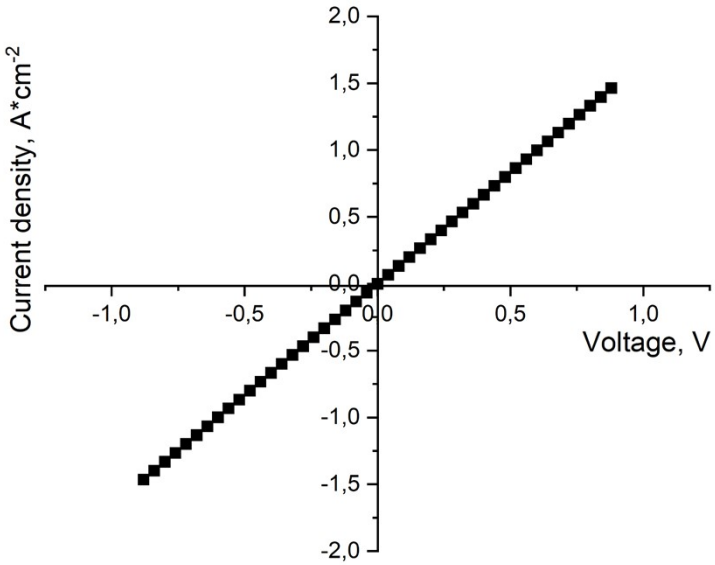

Figure S11. Current-voltage dependence of the ITO/2-TNATA/Al cell.

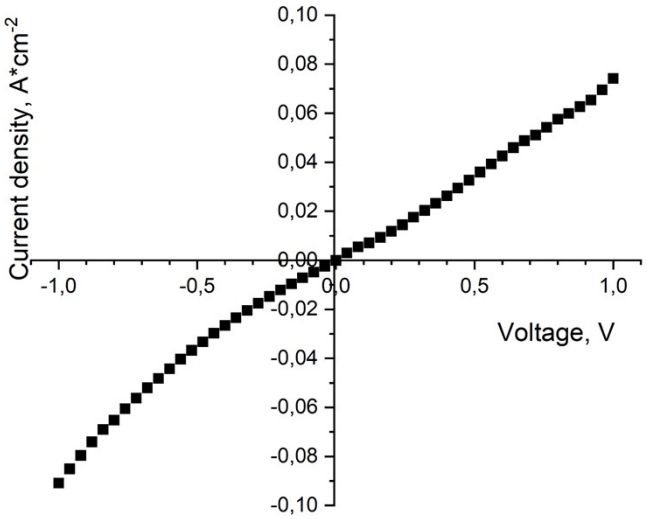

Figure S12. Current-voltage dependence of the ITO/GO/2-TNATA/Al cell.

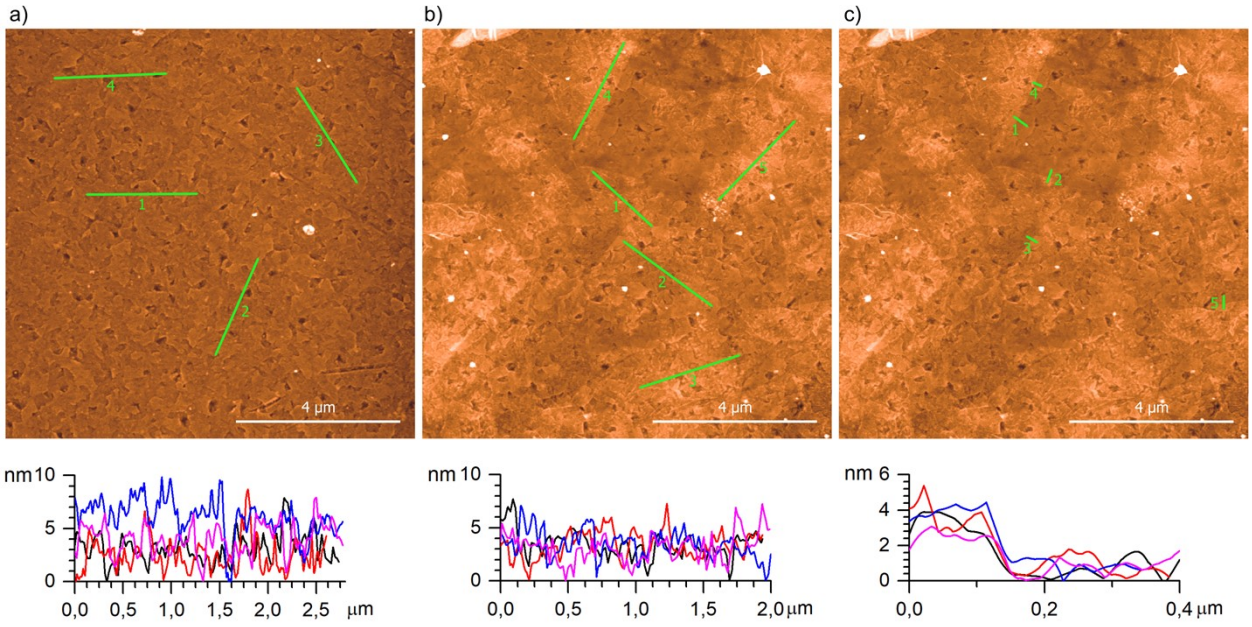

Figure S13. AFM images and corresponding surface profiles for a) pure ITO surface and b,c) ITO+GO surface.

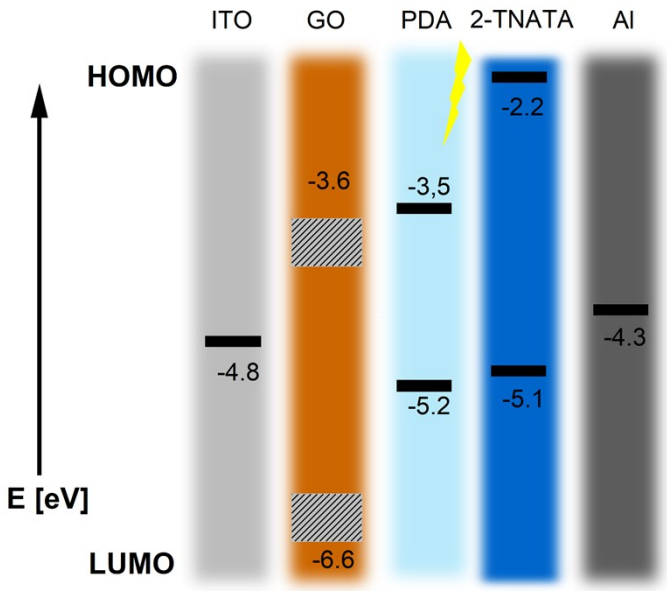

Figure S14. a) Schematically shown energy level diagram for the ITO/GO/PDA/2-TNATA/Al cell.

The HOMO and LUMO energies of GO, PDA, PDI-PA and work function of ITO, aluminum were taken from [1–5]. The values for 2-TNATA, C_{60} and BCP provided by the manufacturer.

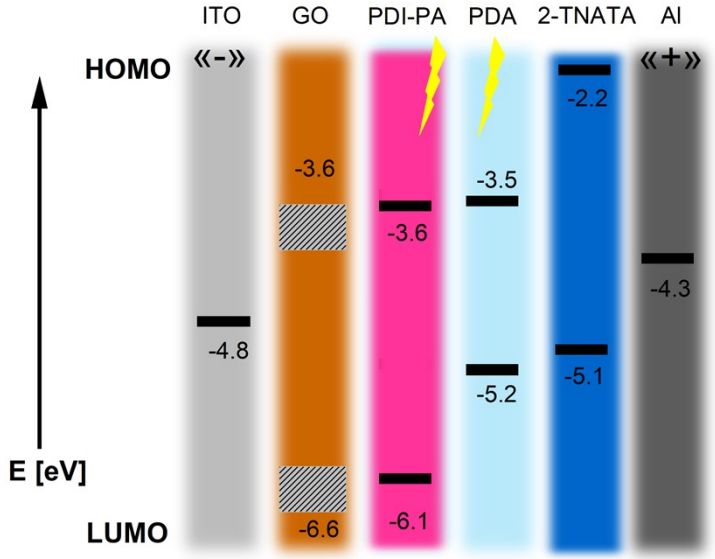

Figure S15. Schematically shown energy level diagram for the ITO/GO/Ni^{2+}/PDI-PA/Ni^{2+}/PDA/2-TNATA/Al cell.

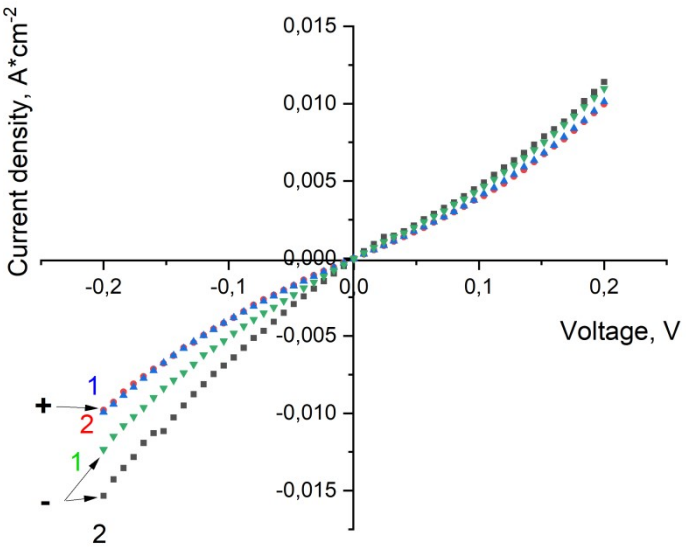

Figure S16. Current-voltage dependences of the ITO/GO/Ni^{2+}/PDI-PA/PDA/2-TNATA/Al cell measured for (*1*) photocurrent and (*2*) dark current under positive and negative bias on ITO.

Table S1. Values of ε_1, ε_2 and dielectric permittivity, obtained by ellipsometry, and RMS error of optical modeling.

ε_1	2.768
ε_2	0.664
ε	2.847
RMSE	6.18×10^{-8}

Ellipsometry allows to determine experimentally the real (ε_1) and imaginary parts (ε_2) of the (complex) dielectric permittivity, from which the dielectric permittivity of GO/Ni^{2+}/PDI-PA/Ni^{2+}/PDA/2-TNATA film was calculated:

$$\varepsilon=\varepsilon_1+i\,\varepsilon_2$$

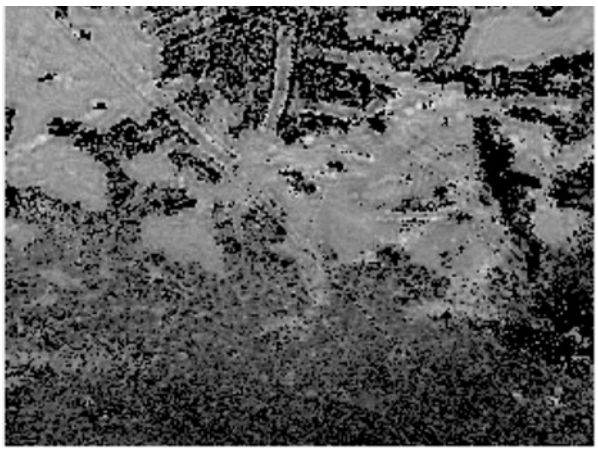

Figure S17. The area of the GO/Ni^{2+}/PDI-PA/Ni^{2+}/PDA/2-TNATA film from which the ellipsometric data were scanned.

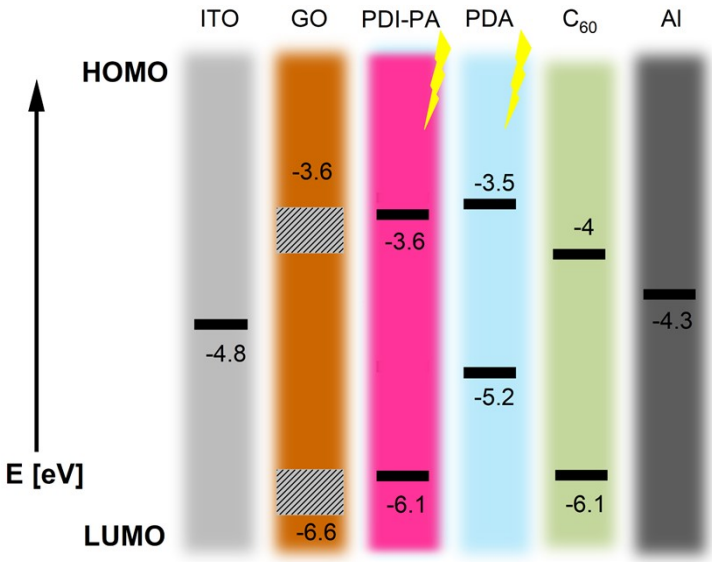

Figure S18. Schematically shown energy level diagram for the ITO/GO/Ni^{2+}/PDI-PA/Ni^{2+}/PDA/C_{60}/Al cell.

References

(1) Zheng, F.; Xu, W. L.; Jin, H. D.; Hao, X. T.; Ghiggino, K. P. Charge Transfer from Poly(3-Hexylthiophene) to Graphene Oxide and Reduced Graphene Oxide. *RSC Adv.* **2015**, *5* (109), 89515–89520.

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