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An Insight on the Effect of Nitrogen Doping on the Performance of Reduced Graphene Oxide Counter Electrode for Dye-Sensitized Solar Cells

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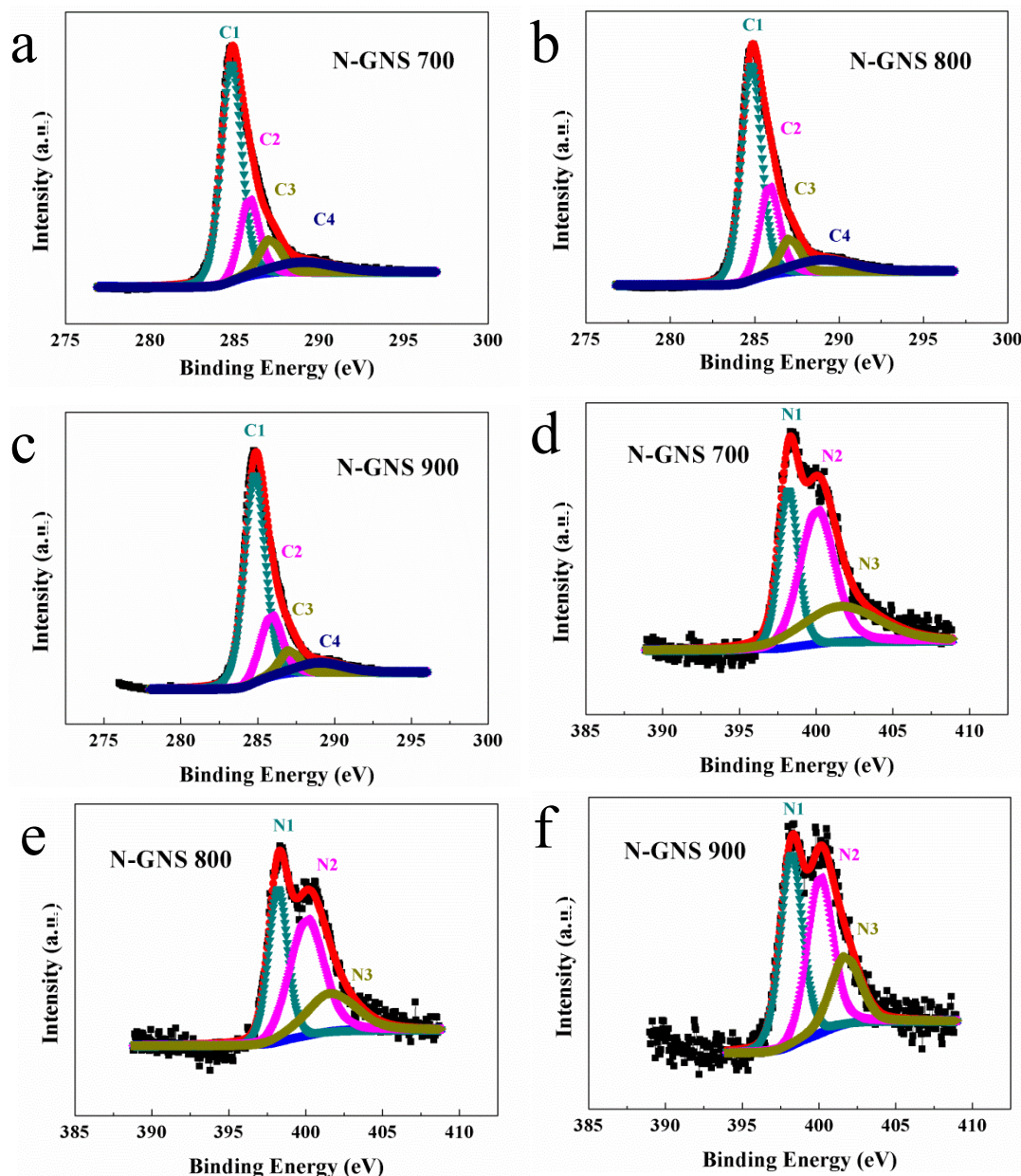


Fig. 1S High-resolution C1s and N1s XPS spectra for N-GNS 700 (a and d), N-GNS 800 (b and e) and N-GNS 900 (c and f).

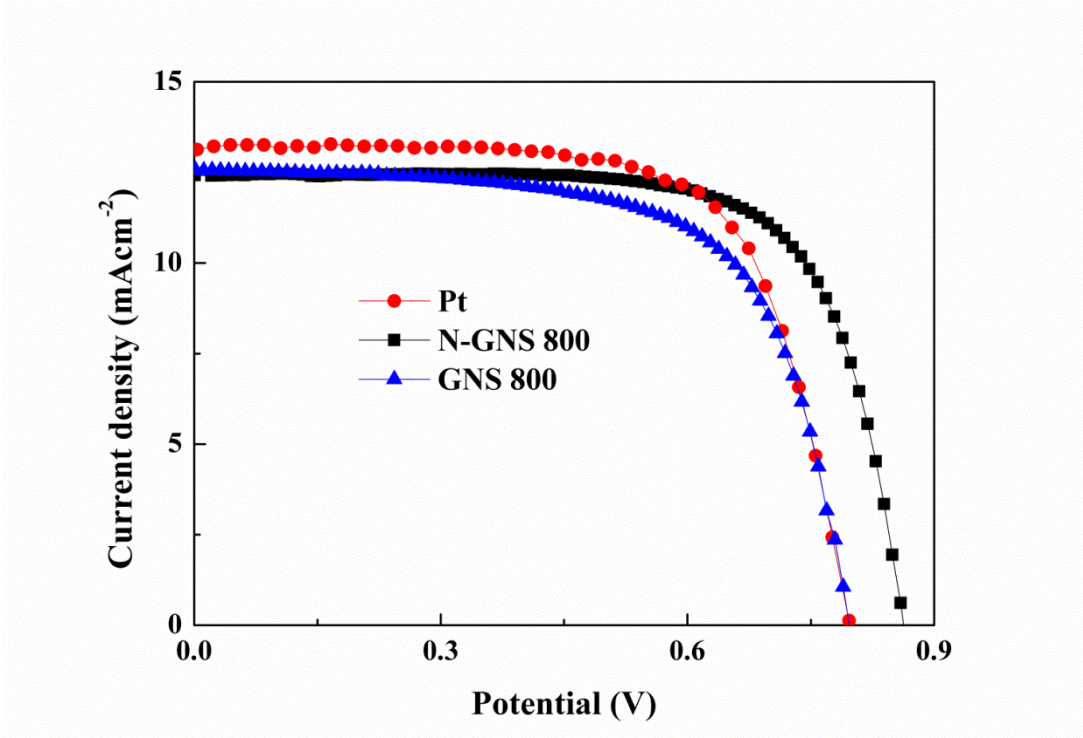


Fig. 2S Photocurrent-voltage (I-V) curves of the DSCs with different CEs of N-GNS 800, GNS 800 and Pt under 1 sun (AM 1.5) illumination.

The photovoltaic performances of DSCs dependant on N-GNS CE are evaluated in contrast to the Pt and GNS CE cell (Fig. 2S) and the detailed parameters are summarized in Table 2S. Under illumination, the photovoltaic characteristics of device equipped with N-GNS 800 CE are V_{OC} 0.864 V, J_{SC} 12.42 mA cm⁻², FF 0.72 and η 7.69 %, while those of the device with GNS 800 CE are V_{OC} 0.795 V, J_{SC} 12.62 mA cm⁻², FF 0.67 and η 6.77 %. Obviously, the V_{OC} value of the N-GNS 800 cell is larger by 60 mV than that of the GNS 800 CE cell. These differences indicate the positive effect of the N-doping on the photoelectrochemical performance.

Table 1S Fitted electrochemical parameters from Electrochemical Impedance Spectra (EIS)

	N-GNS 600	N-GNS 700	N-GNS 800	N-GNS 900
R_s	0.512	0.496	0.506	0.503
Q	7.03	9.36	12.44	17.28
n	0.82	0.79	0.77	0.76
R_{ct}	5.76	7.93	9.07	12.97
O	0.690	0.036	0.039	0.048
B	0.205	0.202	0.151	0.084
O	0.04	0.50	0.46	0.29
B	0.28	5.39	1.08	0.03

Table 2S Photovoltaic parameters of the DSCs using N-GNS 800, GNS 800 and Pt CEs

Samples	Voc (V)	Jsc (mA cm ⁻²)	FF (%)	η (%)
Pt	0.796	13.26	69.39	7.33
N-GNS 800	0.864	12.42	71.89	7.69
GNS 800	0.795	12.62	67.43	6.77