

## Electronic Supplementary Material

### **Synthesis and characterization of reduced graphene oxide /spiky nickel nanocomposites for nanoelectronic applications**

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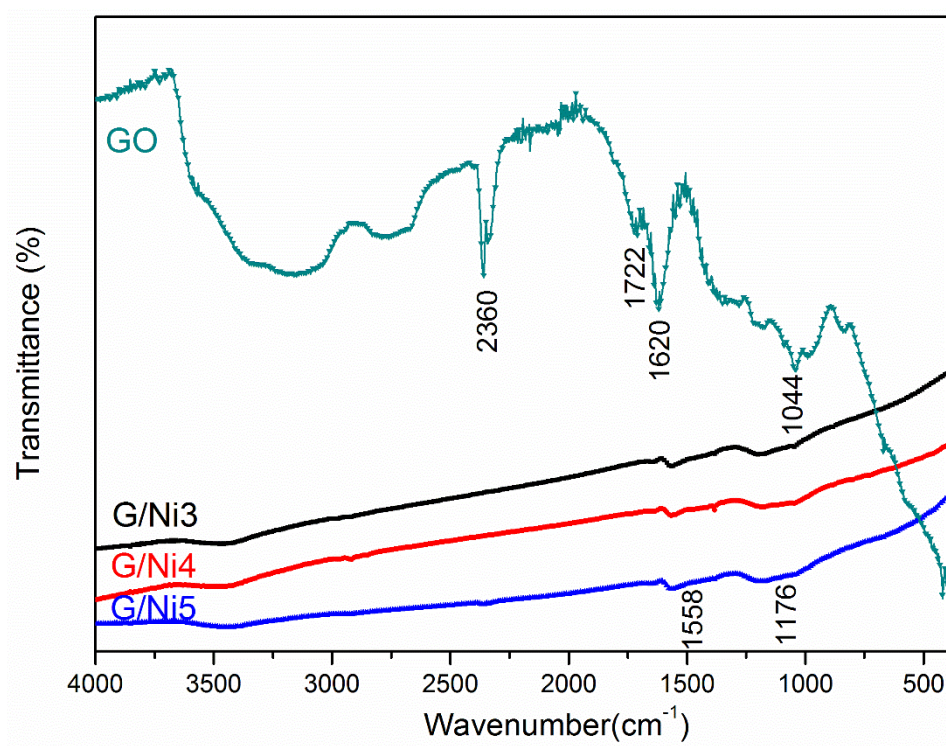
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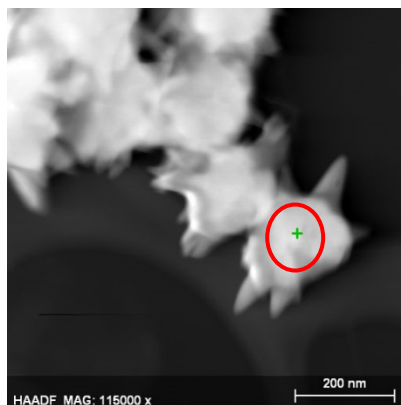
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Figure S1 shows FT-IR spectra of GO, G/Ni<sub>3</sub>, G/Ni<sub>4</sub> and G/Ni<sub>5</sub> nanocomposites. GO profile pattern represents a complete oxidation of graphite. The broad band at high frequency (2800-3600) cm<sup>-1</sup> and also a band at 2360 cm<sup>-1</sup> related to vibration of OH group. Adsorption bands in 1722 cm<sup>-1</sup>, 1620 cm<sup>-1</sup> and 1044 cm<sup>-1</sup> confirmed the vibration of C=O (in COOH), C=C and C-O groups respectively. In RGO/Ni FTIR spectrum there are two weak peaks at 1558 cm<sup>-1</sup> and 1176 cm<sup>-1</sup>. The former is related to C-O vibration band and the later one is related to Graphene sheets vibration. The rest of oxygen functional groups are not exist anymore according to the reduction of graphene oxide [1].



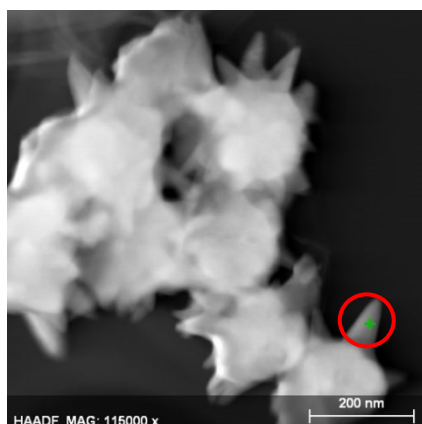
High-angle annular dark-field scanning transmission electron microscopy (HAADF-STEM) of G/Ni5 nanocomposite with corresponding elemental information in the core of a nickel particle and in a single nanothorn are shown in figures S2 and S3 respectively. This information indicated that the core and the nanothorn of nickel particle composed of about 99% metallic nickel and around 1 % oxygen. This confirmed a very thin oxidation layer covering the nickel particles both around the cores and the nanothorns.

**Figure S1.** FT-IR spectra of GO, G/Ni3, G/Ni4 and G/Ni5



Element	series	Net	[wt.%]	[norm. wt.%]	[norm. at.%]	Error in wt.% (3 Sigma)
Oxygen	K-series	5062	1,14954	1,14954	4,091551	0,202793
Nickel	K-series	1846671	98,85046	98,85046	95,90845	21,144
		Sum:	100	100	100	

**Figure S2.** High-angle annular dark-field scanning transmission electron microscopy of G/Ni5 nanocomposite and corresponding elemental information at selected area of nickel core.



Element	series	Net	[wt.%]	[norm. wt.%]	[norm. at.%]	Error in wt.% (3 Sigma)
Oxygen	K-series	703	0,749622	0,749622	2,69604	0,189628
Nickel	K-series	394874	99,25038	99,25038	97,30396	21,23402
		Sum:	100	100	100	

**Figure S3.** High-angle annular dark-field scanning transmission electron microscopy of G/Ni5 nanocomposite and corresponding elemental information at selected area of one single nanothorn.

## References

1. Ji, Z.Y., et al., *Reduced graphene oxide supported FePt alloy nanoparticles with high electrocatalytic performance for methanol oxidation*. New Journal of Chemistry, 2012. **36**(9): p. 1774-1780.

