

## Supplementary Information

### Catalyst-free growth of carbon nanotube arrays directly on Inconel® substrates for electrochemical carbon-based electrodes

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Figure S1. XRD patterns of the as received (i) and polished/heat-treated (ii) surfaces of the Inconel substrate.

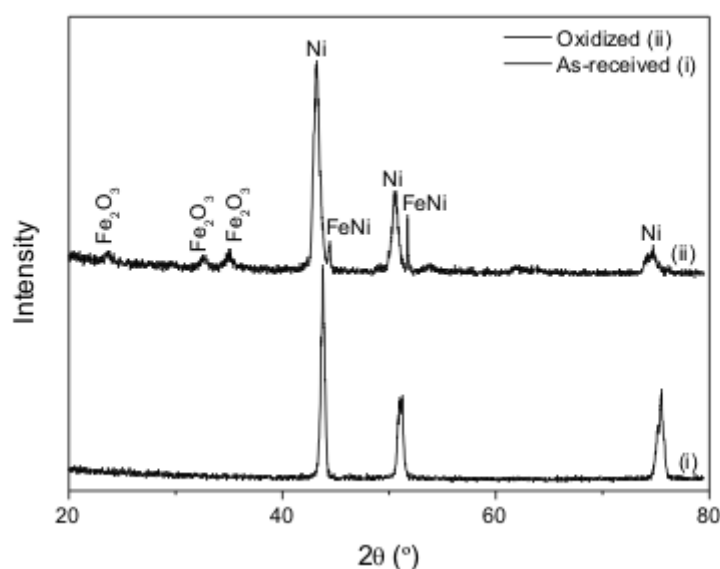


Figure S2. High magnification SEM Inconel surface images of as received (a) and polished (b). The Inconel surface after the polishing procedure clearly appears smoother and featureless.

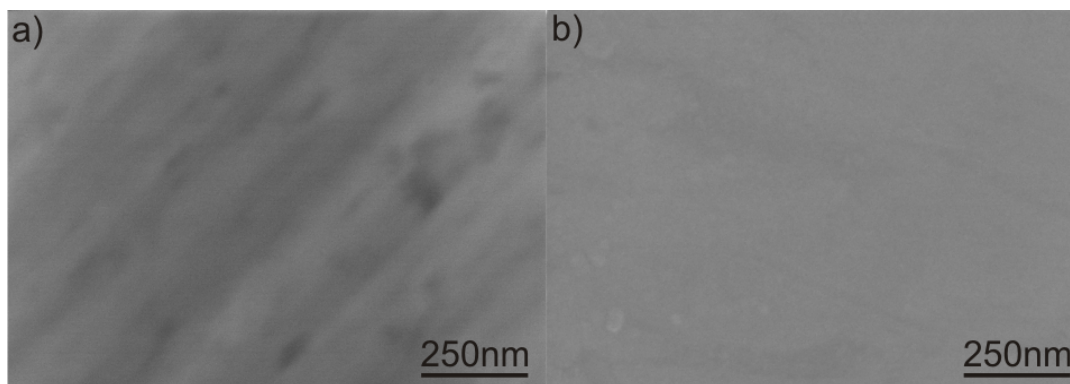


Figure S3. SEM cross section image (a) and corresponding EDS line scan profile (b) of the Inconel substrate before the heat treatment showing the elemental composition of the Inconel along the white scan line. The strong Ni signal and weak Fe signal support that the outermost surface is namely composed by Ni. The SEM cross image (c) and corresponding EDS line scan profile (d) of the Inconel substrate after the heat treatment were also inserted for comparison purpose.

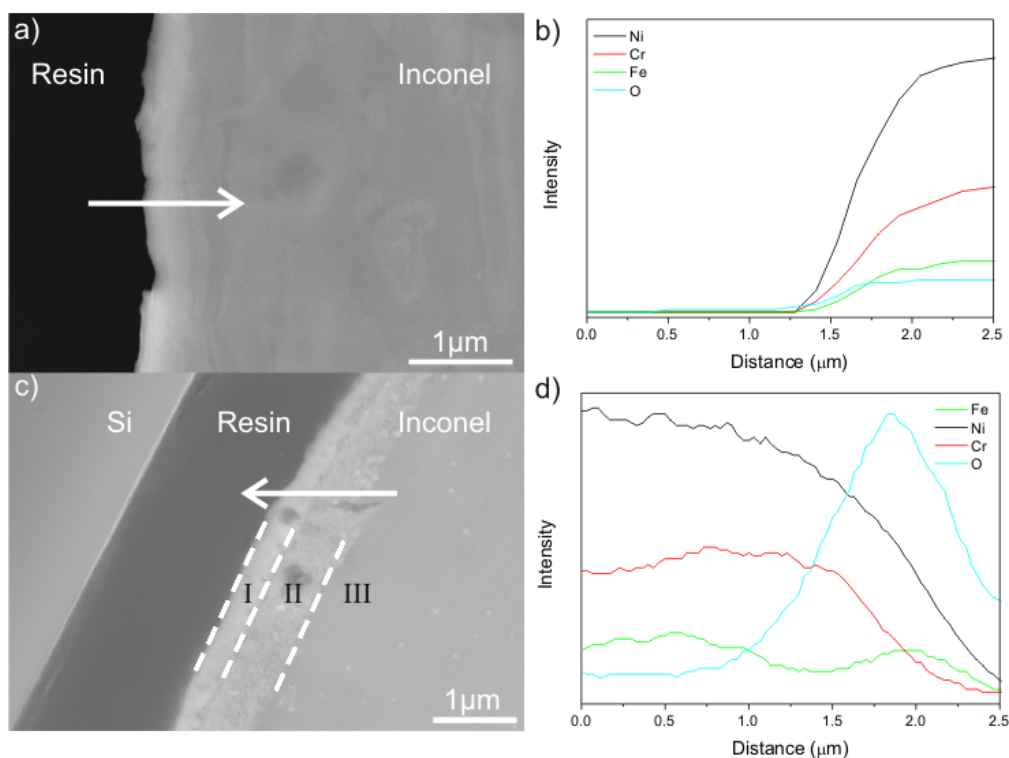


Figure S4. GDOES elemental depth profile for unoxidized (a) and oxidized (b) Inconel. The unoxidized Inconel GDOES elemental depth profile reveals a strong signal for the Ni which means that the outermost surface is composed namely by Ni. The oxidized GDOES elemental depth profile was inserted for comparison purpose.

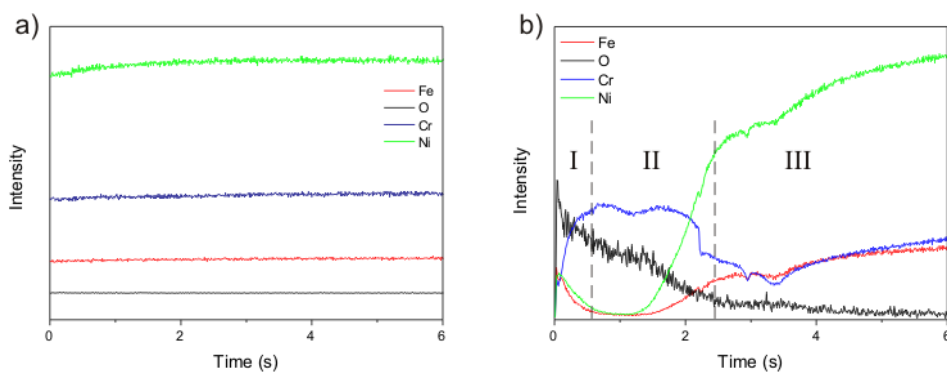


Figure S5. Raman spectra of CNTs grown on Si buffered substrate (i) and Inconel substrate (ii), for comparison purpose.

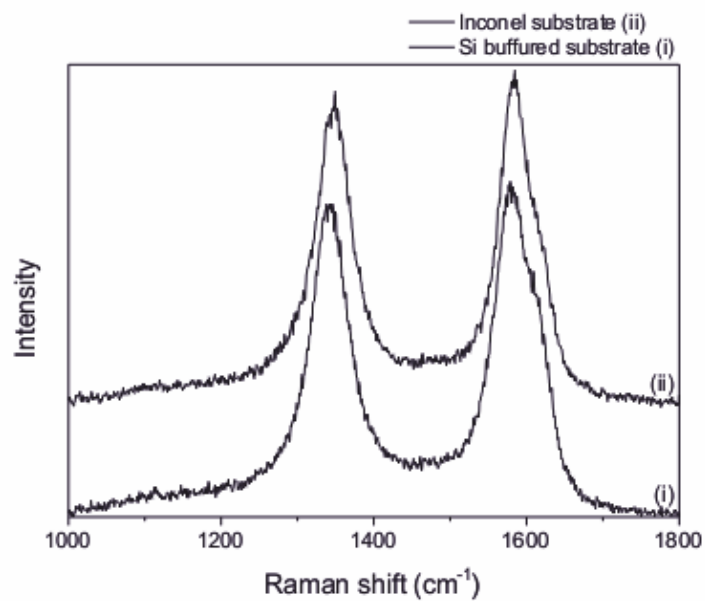


Figure S6. XRD pattern of the Inconel substrate after the CNT growth step (CNTs were removed by sonication process not to alter the surface).

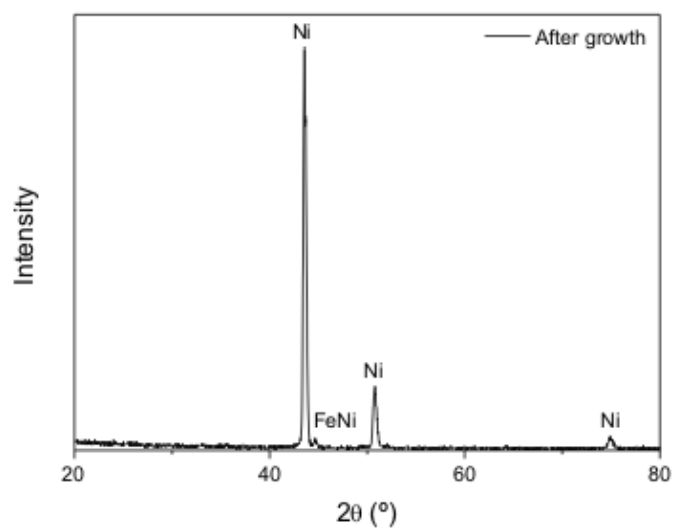


Figure S7 Overview TEM image illustrating the catalyst nano-sized particles (marked with a white arrow) inside of the tubes.

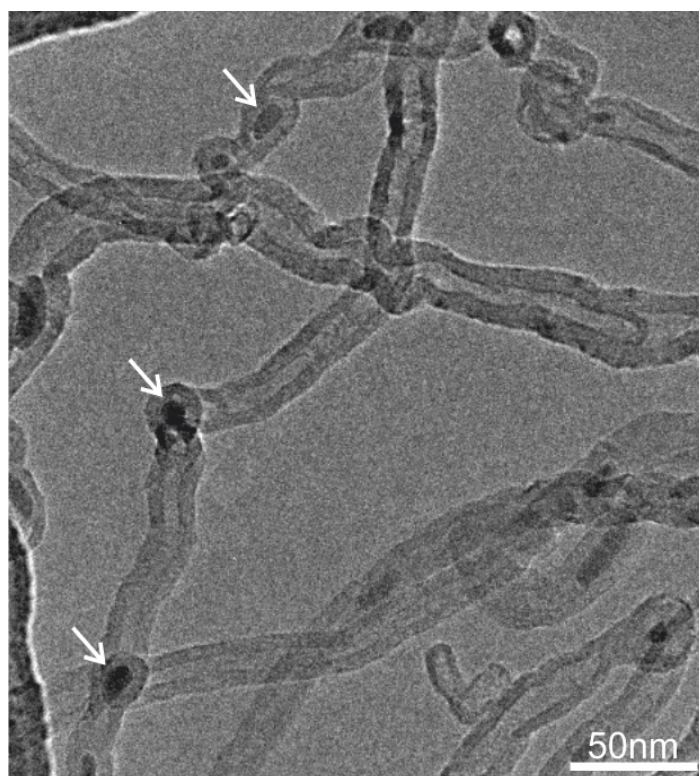


Figure S8. Nyquist plot of the CNTs/Inconel electrode.

