Electronic Supplementary Material (ESI) for Nanoscale.


# Electronic Supplementary Information

## Diels-Alder functionalized carbon nanotubes for bone tissue engineering: *in vitro/in vivo* biocompatibility and biodegradability

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### Preparation of $HNO_3$ functionalized CNTs

The commercialized MWCNTs (Nanocyl, NC7000) were purified according to the process described in the section “Production, purification and functionalization of CNTs” of the manuscript. Afterwards, the pre-treated CNTs were refluxed in 70 wt.% concentrated $HNO_3$ aqueous solution (≥99%, Sigma-Aldrich) for 2h at 80 °C. Then, the

CNTs were collected on a 0.22 μm pore size disc filter (hydrophobic PTFE, Millipore) and washed with deionized water until the pH of the filtrate became nearly neutral. Finally, the tubes were dried overnight in an oven at 80 °C.

## Supplementary Figures

**Fig. 1S -** μ-Raman (532 nm) spectra of CVD grown CNTs: purified (p-CNT); purified and HNO3 functionalized (p,f(HNO3)-CNT) and purified and Diels-Alder functionalized (p,f-CNT).

**Fig. 2S -** μ-Raman (532 nm) spectra of commercialized CNTs (Nanocyl, NC7000): purified (p-CNT); purified and Diels-Alder functionalized (p,f-CNT) and p,f-CNT after $N_2$ annealing at 1000 ºC.

**Fig. 3S -** $TG_{O2}$ and $TG_{N2}$ curves of the p-CNTs and p,f-CNTs samples.

**Fig. 4S -** EDS profiles of samples p-CNT and p,f-CNT.

**Fig. 5S -** (a) Acid-base titration curves of the p-CNTs and p,f-CNTs samples. (b) Respective FTIR spectra of the samples in (a).

**Fig. 6S -** (a and b) Colour surface height maps with dotted black lines marking the extraction of representative linear roughness profiles of (c and d) the original data and of (e and f) 25 μm Gaussian filtered data of samples p-CNT and p,f-CNT showing submicrometer roughness parameters for the filtered surfaces.

**Fig. 7S -** High magnification SEM images of p-CNT and p,f-CNT membranes before (a and b) and after (c and D) incubation for 4 days in culture medium in the same experimental conditions as the cell cultures.

**Fig. 8S -** Optical images of the sections of the histochemical staining for peroxidase activity of subcutaneous implanted membranes in Wistar rats, at 3 days post-operatively.