Supporting Information

The biocompatibility and anti-biofouling properties of magnetic core-multishell Fe@C NWs/AAO nanocomposites

*André M. Lindo[a,b], Eva Pellicer[c]**, Muhammad A. Zeeshan[a], Roman Grisch[a], Famin Qiu[a], Jordi Sort[c,d], Mahmut S. Sakar[a], Bradley J. Nelson[a], Salvador Pané[a]**

[a] Multi-Scale Robotics Lab, Institute of Robotics and Intelligent Systems, ETH Zurich,8092 Zurich, Switzerland. E-mail: * vidalp@ethz.ch
[b] Instituto de Ciências Biomédicas Abel Salazar da Universidade do Porto, 4099-003 Porto, Portugal.
[c] Departament de Física, Facultat de Ciències, Universitat Autònoma de Barcelona, Campus UAB, 08193 Bellaterra, Barcelona, Spain. E-mail: ** Eva.Pellicer@uab.cat
[d] Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain.

S1: Cross-section of the alumina templates after pore widening

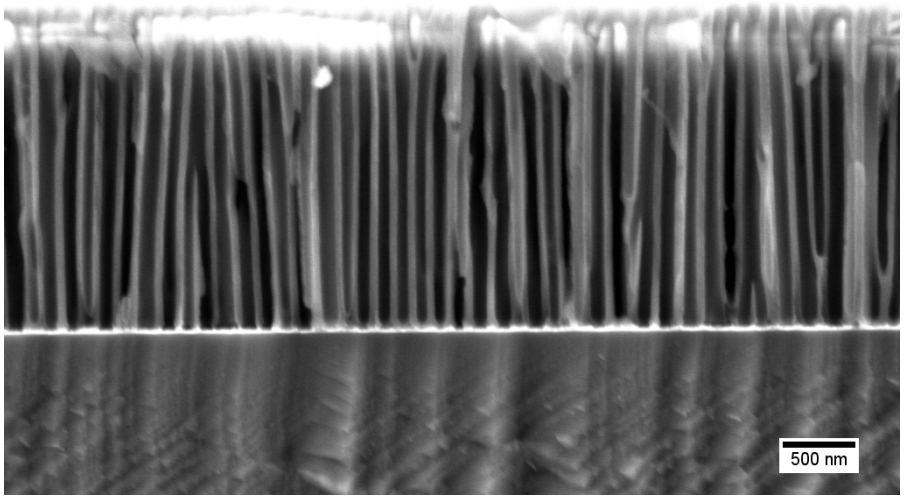

Figure S1. SEM image of the cross-section from the AAO template fabricated by anodization using oxalic acid at 60V. The template was etched with 5.5 wt% phosphoric acid to enlarge the pores and remove the barrier layer.

S2: Comparison between Fe NWs and Fe@C NWs

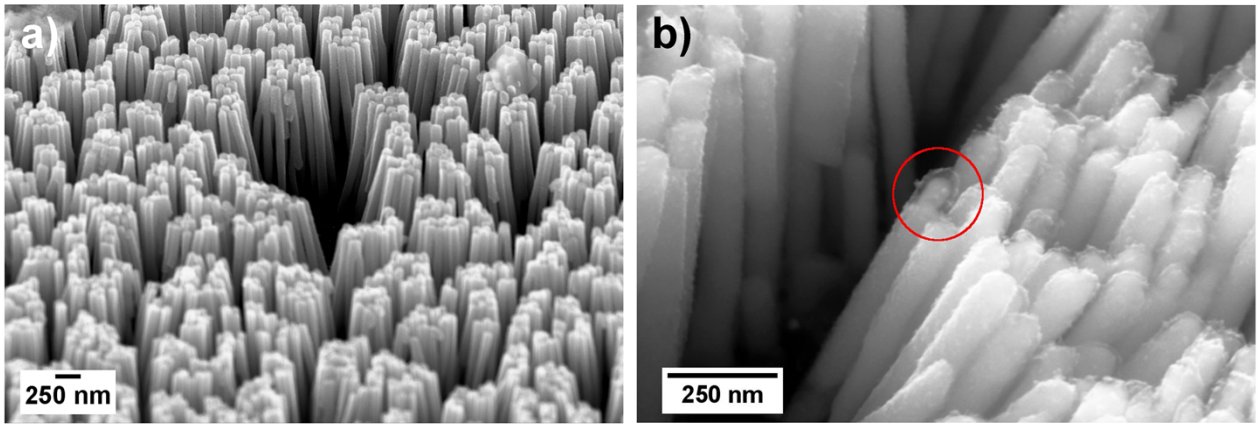

Figure S2. SEM images of a) uncoated and b) C-coated Fe NWs grown in AAO template. In b), the carbon coating of the core-multishell Fe@C NWs that was grown at 750 ºC is highlighted. The AAO template was removed using a 10 wt% NaOH solution.

S3: Hysteresis loops of Fe NWs at 900 ºC and Fe@C NWs at 750 ºC and 900 ºC

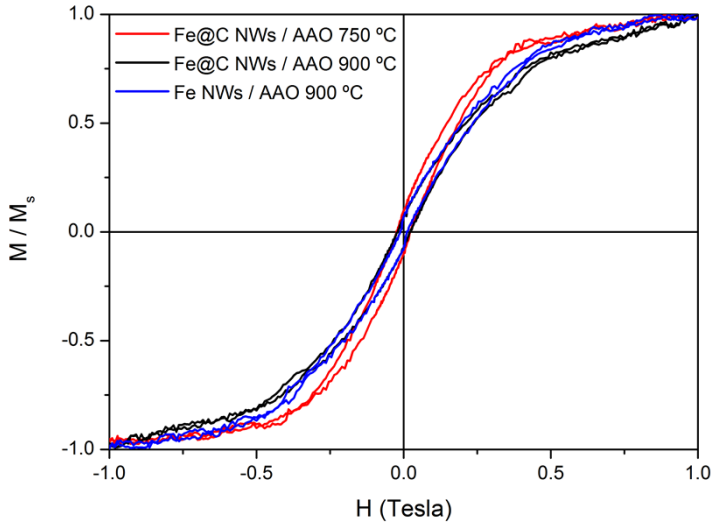

Figure S3. Normalized room-temperature hysteresis loops of nanocomposites filled with uncoated Fe NWs annealed at 900 ºC and C-coated Fe NWs at 750 ºC and 900 ºC.

S4: SEM image of attempted AAO etching and list of etchants used

Etchants
10 M NaOH, 80 °C
0.5% HF (wt%)
1.8% H_2CrO_4 + 6% H_3PO_4 (wt%), 65 °C
Gold etchant, Nickel Compatible
+ tip sonication

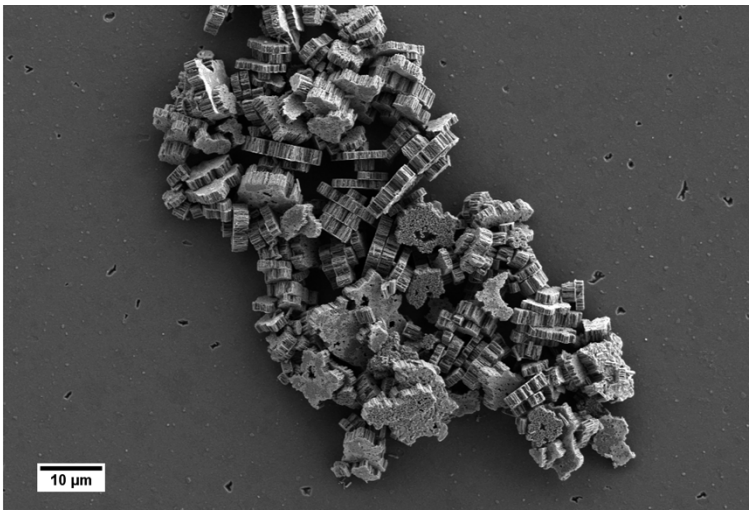

Figure S4. b) SEM image of the remaining AAO template after attempting its dissolution with the etchants listed on a) combined with high power tip sonication.

S5: List of the measured contact angles and photograph of a drop on the nanocomposite's surface

a)

Sample	Young-Laplace	Standard Method
Fe NWs / AAO RT	104.7 ± 1.5 °	100.4 ± 1.0 °
Fe NWs / AAO 900 °C	94.6 ± 1.6 °	92.4 ± 0.3 °
Fe@C NWs / AAO 750 °C	N.A.	143.5 ± 1.9 °
Fe@C NWs / AAO 900 °C	114.7 ± 5.2 °	111.1 ± 3.0 °

b)

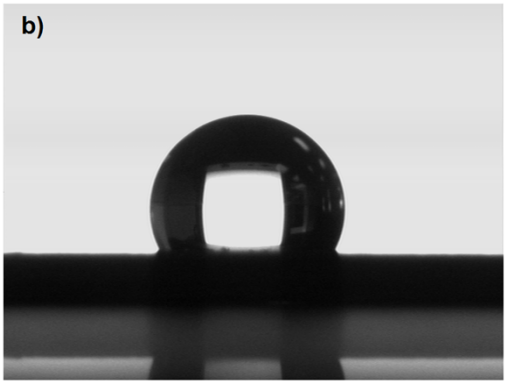

Figure S5. a) List of the measured surface contact angles obtained with different materials embedded in AAO. It was not possible to measure with the Young-Laplace method when the CVD temperature was 750 °C. b) Drop of culture medium on the surface of the nanocomposite.

S6: WST-1 test result and fibroblast confluence in culture

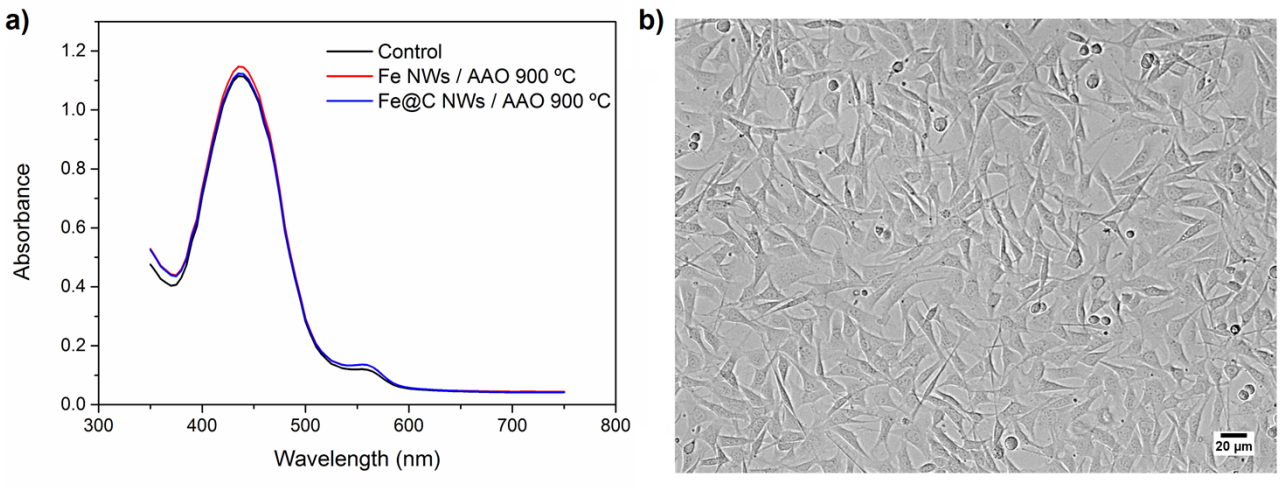

Figure S6. a) Absorption spectrum obtained from the WST-1 test for cells incubated in culture medium that was previously in contact with nanocomposites filled with Fe NWs and with C-coated Fe NWs. b) Fibroblast confluence in culture medium that was incubated previously with different AAO templates.

S7: SEM image showing fibroblasts on the surface of AAO template

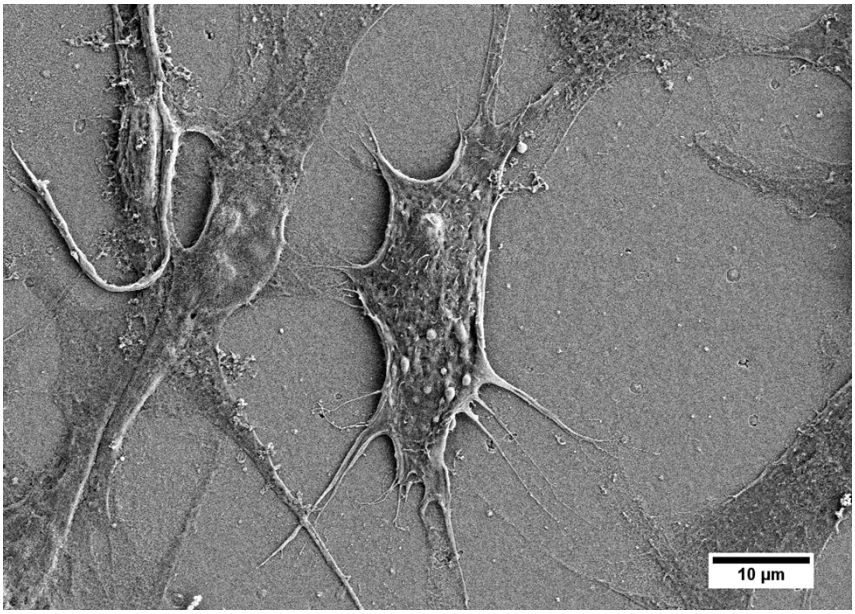

Figure S7. SEM image of fibroblasts growing on the surface an AAO template without pore widening at room temperature.

S8: Bright-field microscope image of carbon coated filled nanocomposite sample interface

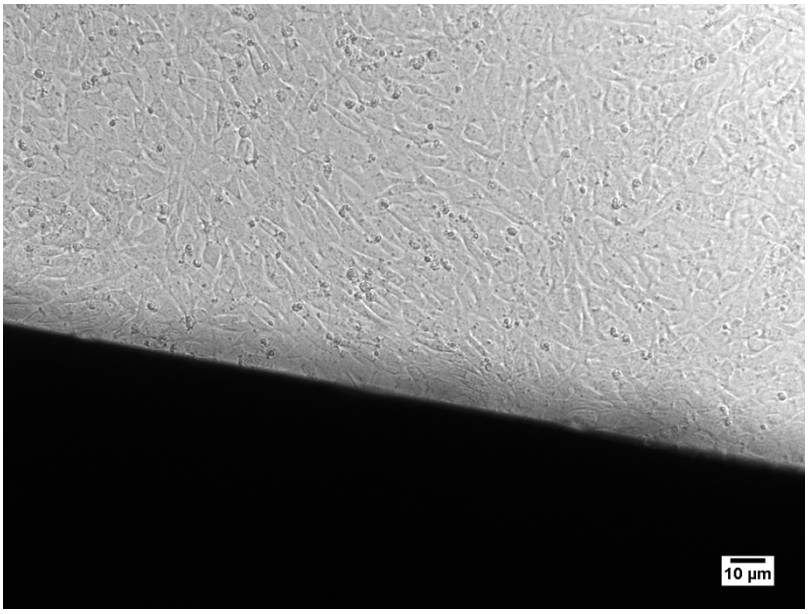

Figure S8. Bright-field microscope picture taken at the edge of a carbon coated filled nanocomposite sample. Cell confluence can be seen around the sample at the bottom of the well plate but not on the surface of the filled nanocomposites. This proves once more that even though the surface of filled nanocomposite samples doesn't allow cell proliferation, the samples do not show any toxic effect to fibroblasts.