

## Electronic Supplementary Information (ESI)

### Highly homogeneous core-sheath polyaniline nanofibers by polymerisation on wire-shaped template

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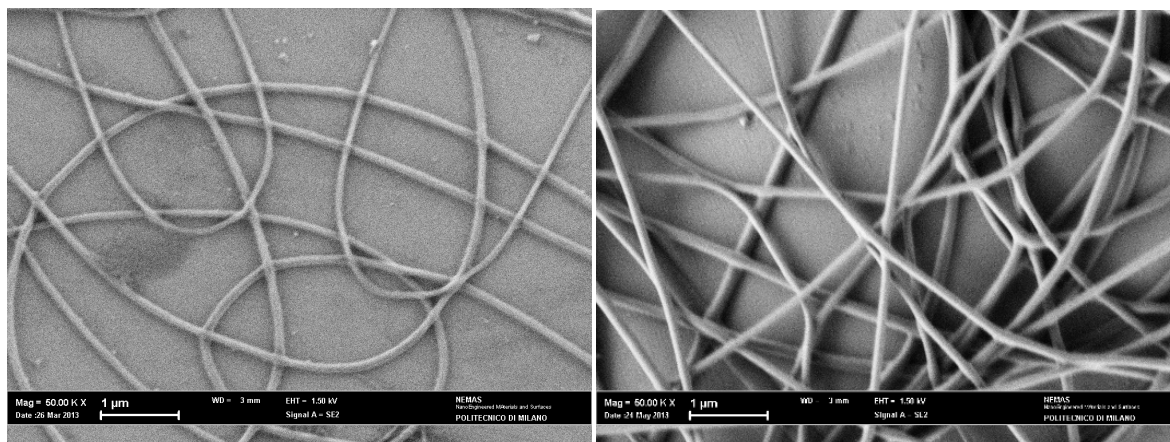
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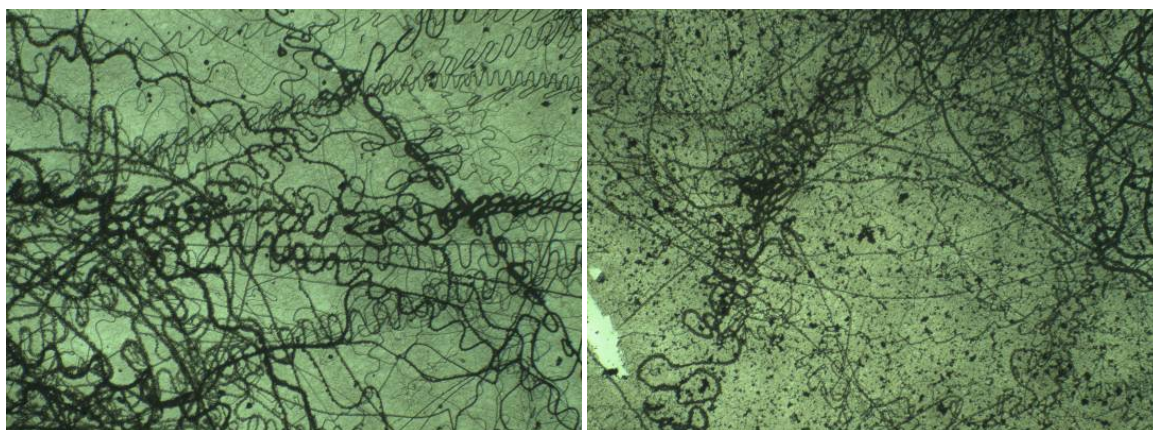
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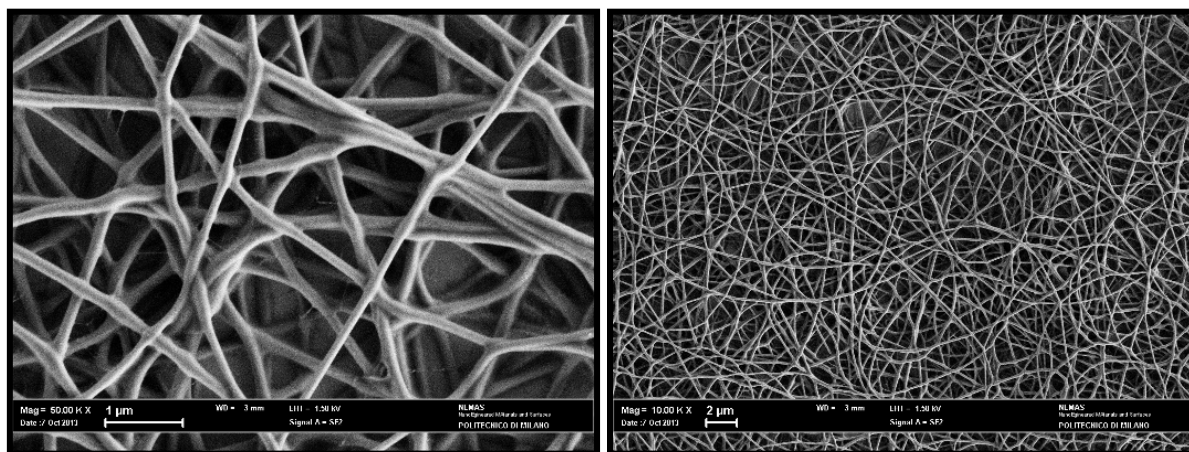
**Table 1** : Assignment of the main IR band.



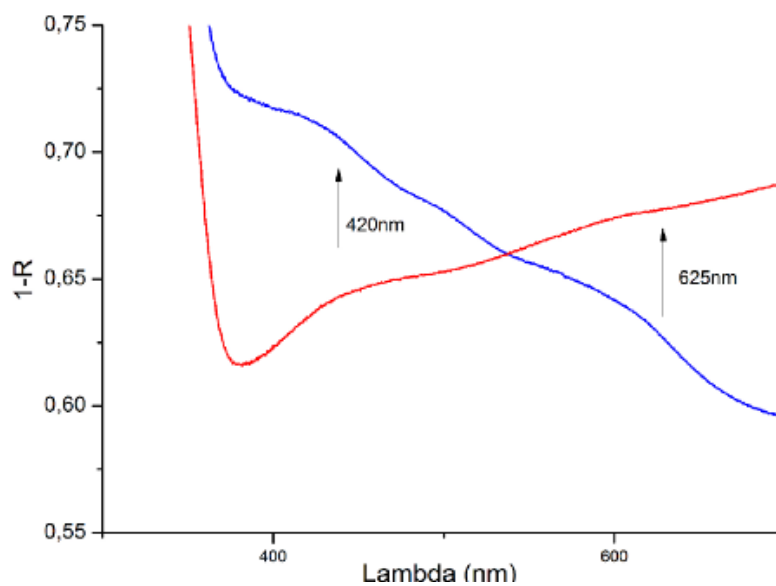
**Figure 1.** SEM images of N-FeA electrospun nanofibers (on the left) and N-FeH electrospun nanofibers (on the right) at 15 kV with a flow rate of 0.05 mL/h.



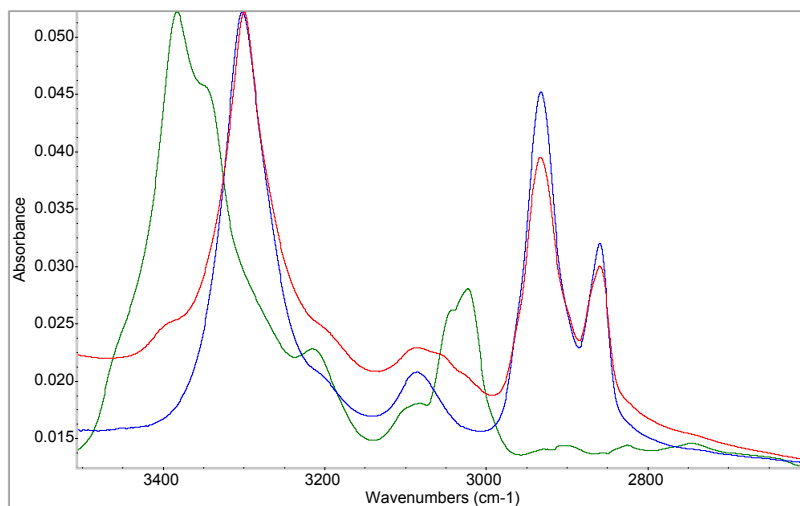
**Figure 2.** OM images of N-FeH (8.85%  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ ) electrospun nanofibers after polymerization treatment (left:  $t_{\text{DIFF}} = 60' + t_{\text{OX}} = 30'$ ; right:  $t_{\text{DIFF}} = 75' + t_{\text{OX}} = 60'$ ).



**Figure 3.** SEM images of N-ADPA (67 wt% ADPA) electrospun nanofibers at different magnifications.

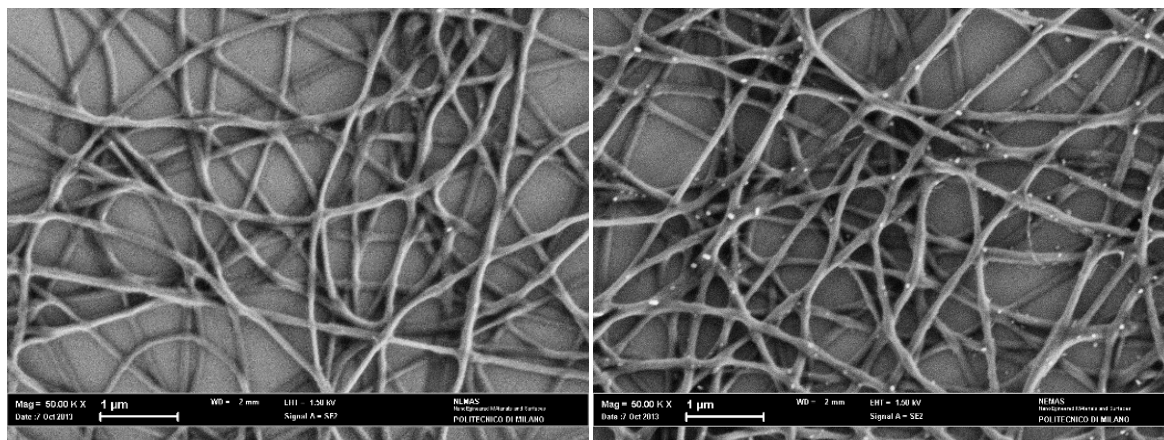


**Figure 4.** UV-Vis reflectance spectra of N6 fibers and N-sADPA nanofibers (blue); N-ADPA nanofibers (red). Magnification of the region between 300 and 700 nm.

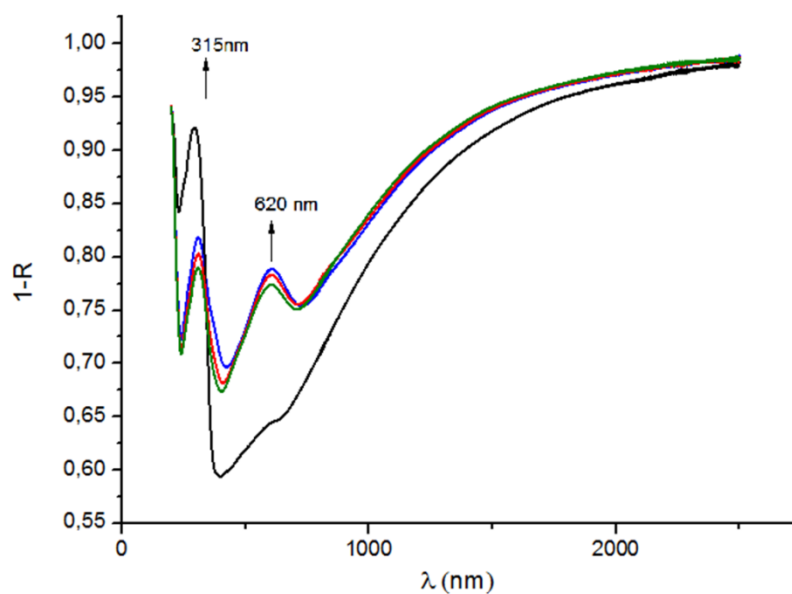


**Figure 5.** FTIR spectra in the region 3500-2600 cm<sup>-1</sup> of electrospun N6 (blue line) and N-sADPA mats (red line), and ADPA film (green line).

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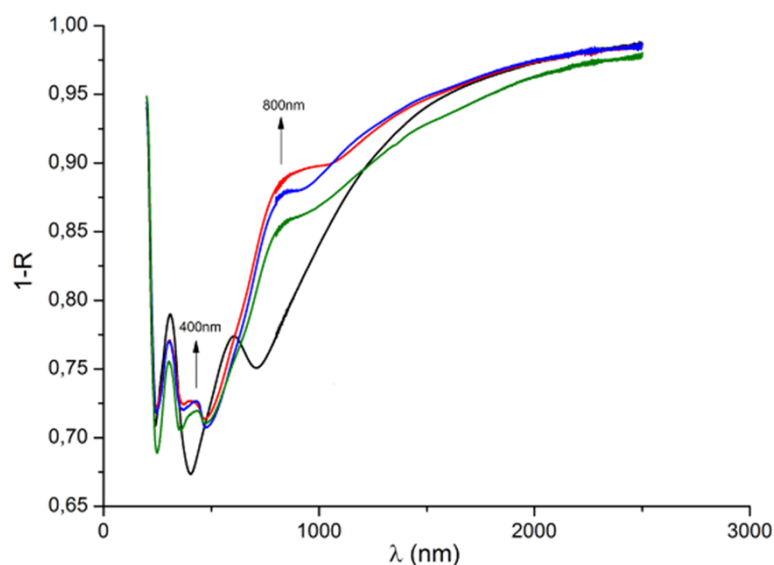


**Figure 6.** SEM images of N-sADPA (67 wt% ADPA) electrospun fibers polymerized in an oxidation bath containing p-TSA (0.175 M) after an oxidative polymerization treatment ( $t_{\text{OX}} = 150$  s).

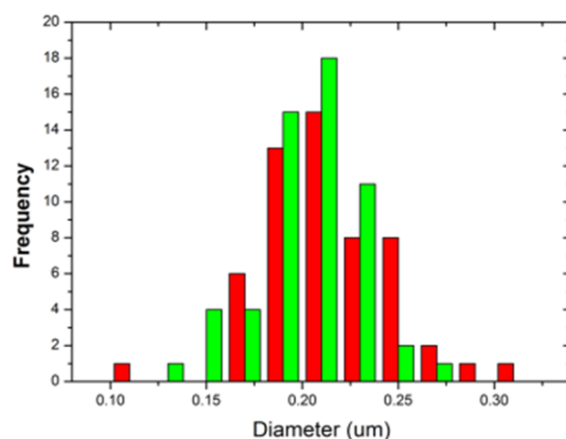


**Figure 7.** UV-Vis reflectance spectra of N-sADPA (67 wt% ADPA) electrospun nanofibers: washed sample (black);  $t_{\text{OX}} = 20$  s (blue);  $t_{\text{OX}} = 50$  s (red);  $t_{\text{OX}} = 120$  s (green).

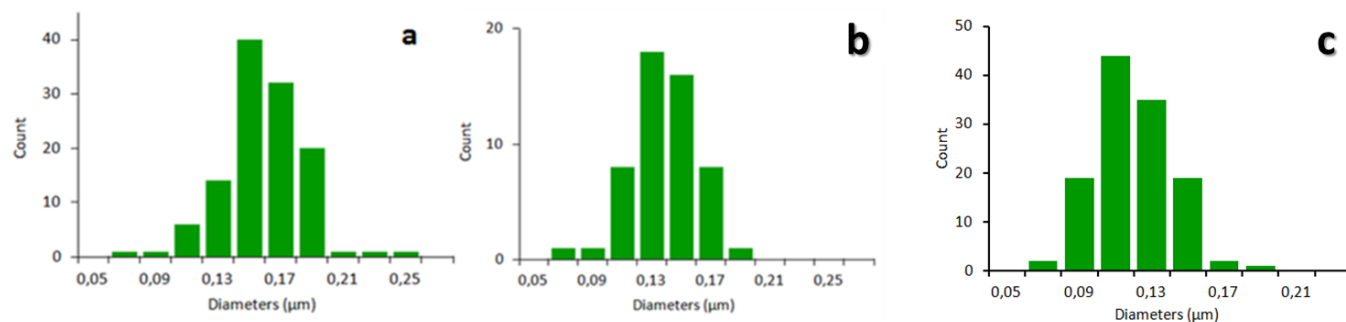




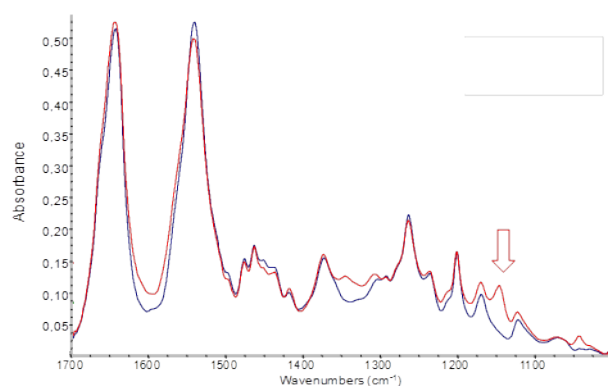
**Figure 8.** UV-Vis reflectance spectra of N-sADPA (67 wt% ADPA) electrospun nanofibers:  $t_{\text{ox}} = 150$  s (black);  $t_{\text{DOP}} = 30$  s (green);  $t_{\text{DOP}} = 60$  s (red);  $t_{\text{DOP}} = 60$  s after 1 h (blue).



**Figure 9.** Diameter distribution of N-sFeH electrospun nanofibers after diffusion step:  $t_{\text{DIFF}} = 120'$  (red) mean diameter is  $214 \pm 35$  nm and  $t_{\text{DIFF}} = 180'$  (green) mean diameter is  $200 \pm 30$  nm.



**Figure 10.** Diameter distribution of N-sADPA electrospun nanofibers: a) as spun; b) after oxidative polymerization ( $t_{\text{ox}} = 150$ s).



**Figure 11.** FTIR spectra of N-sADPA (67 wt% ADPA vs Nylon 6) in wavenumbers range 1700-500  $\text{cm}^{-1}$ : mat before and after base treatment (KOH 0.175 M). The red arrow indicates the band disappearing by treatment with base.

Wavenumber ( $\text{cm}^{-1}$ )	Assignment	Material*	Wavenumber ( $\text{cm}^{-1}$ )	Assignment	Material*
3450	Aromatic secondary amine: <i>N-H stretching</i>	ADPA	1600	Primary amine: <i>N-H bending</i>	ADPA
3380	Aromatic primary amine: <i>N-H stretching</i>	ADPA	1542	Amide II	Nylon 6
3300	Aliphatic secondary amine: <i>N-H stretching</i>	Nylon 6	1520-1490	Aromatic ring: <i>stretch</i>	ADPA
3100 - 3000	Aromatic ring <i>C-H stretching</i>	ADPA	1460-1440	$-(\text{CH}_2)-$ <i>bending</i>	Nylon 6
2930	$-(\text{CH}_2)-$ <i>asymmetric stretching</i>	<i>C-H</i> Nylon 6	1360	$-(\text{CH}_2)-$ <i>wagging</i>	Nylon 6
2850	$-(\text{CH}_2)-$ <i>symmetric stretching</i>	<i>C-H</i> Nylon 6	1350-1280	Aromatic secondary amine: <i>C-N stretch</i>	ADPA
1650	Amide I	Nylon 6	830	Aromatic C-H 1,4-disubstituted phenyl <i>out-of-plane bending</i>	ADPA
1620	Aromatic ring: <i>stretching</i>	ADPA	750 - 700	Aromatic C-H Monosubstituted phenyl <i>out-of-plane bending</i>	ADPA

**Table 1.** Assignment of the main IR bands: main wavenumbers, IR mode and material correlation. (\**N*-phenyl-1,4-phenylenediamine - ADPA)