

## Supporting Information

### Fabrication and Characterization of Three Dimensional Core-Shell Structure

#### Nanofibers Designed for 3D Dynamic Cell Culture

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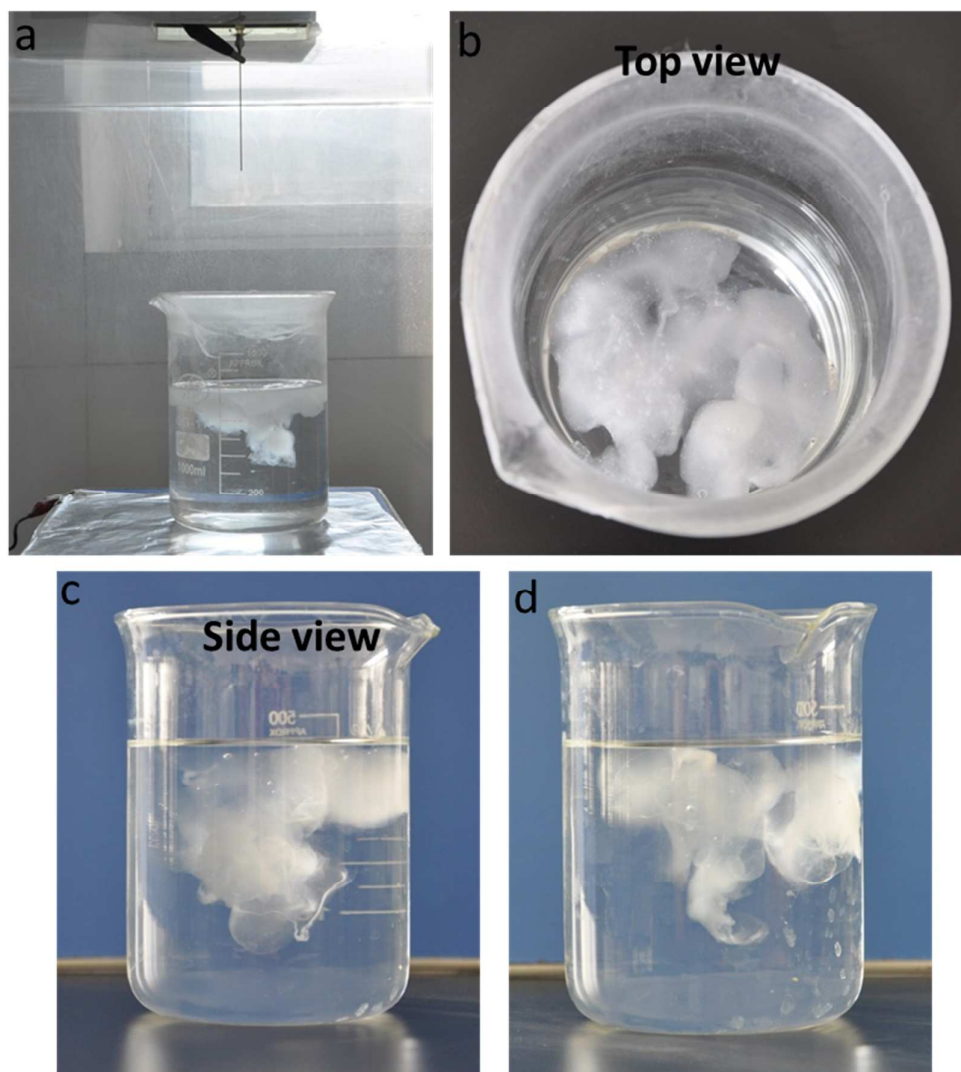
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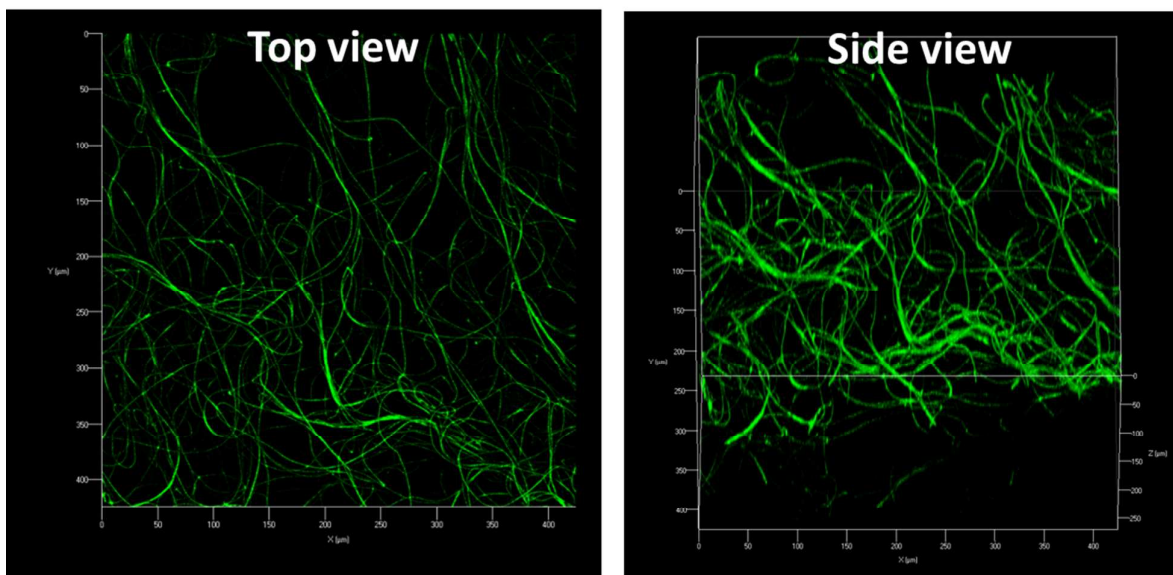
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### **NFMs fabrication**

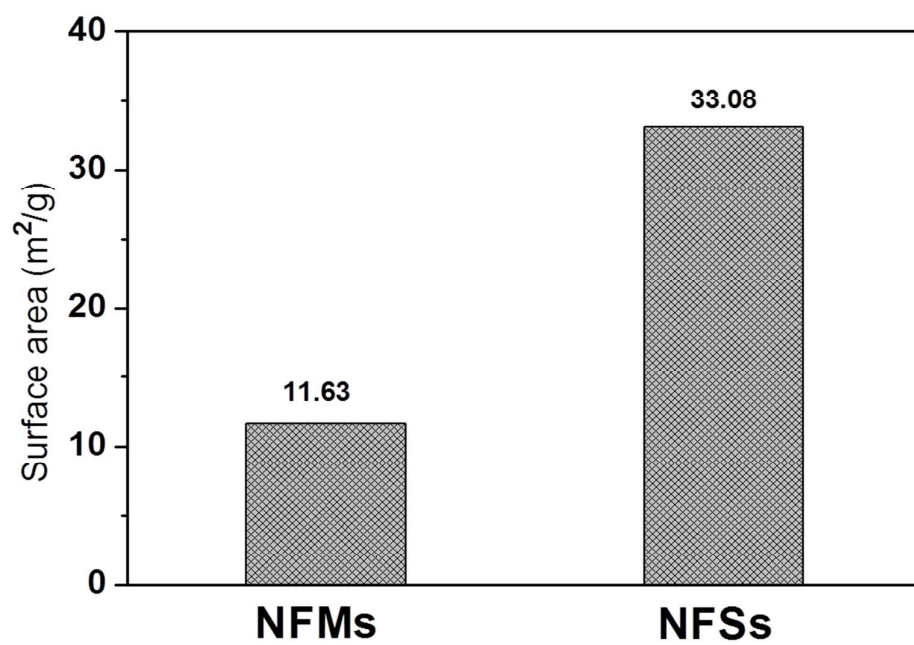
For NFMs fabrication, the electrospinning was performed similarly as previous process.<sup>S1</sup> a precursor solution was prepared by dissolving PAN (Mn=90, 000) in the solvent of N, N-dimethylformamide (DMF) at concentration of 10 wt%, under constant stirring until the mixture was clear, viscous and homogenous. The electrospinning was performed using a customized spinning system. Subsequently, the mixed solution was fed into a syringe capped with a 0.22 gauge blunt-tripped needle and driven by a syringe pump (Langer CO., Baoding, China) at a controllable feed rate of 1.0 mL/h. The distance between the tip of the syringe needle and the collector was 10 cm and a voltage of 15 kV was applied by a high voltage DC power supply (Dongwen High Voltage, Tianjing, China) to generate a continuous jetting stream. The obtained nanofibers were deposited onto the aluminium foil-covered collector. The relevant temperature and humidity during the electrospinning were  $20\pm 3^{\circ}\text{C}$  and  $40\pm 5\%$ , respectively.



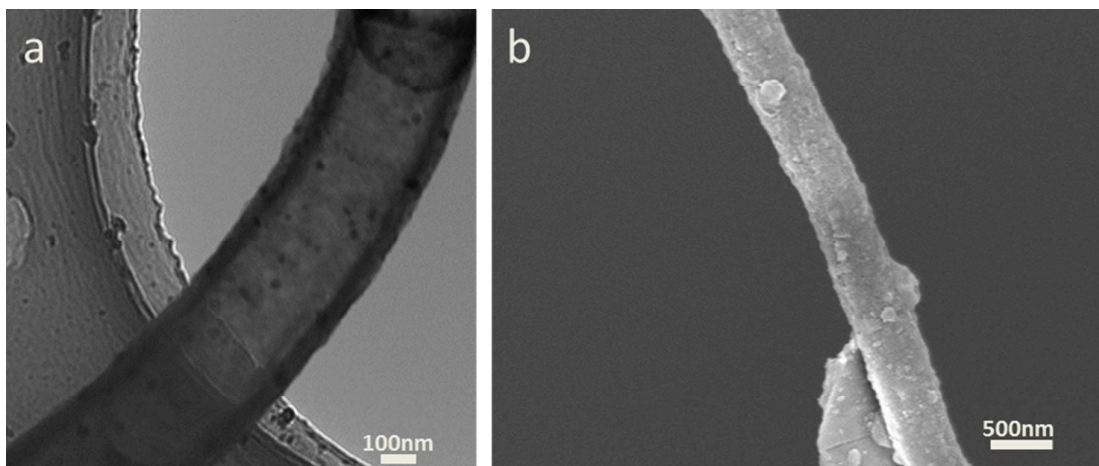
**Figure S1.** The fabrication steps of the 3D NFs. (a) Electrospinning the nanofibers into ethanol solution. (b, c) The obtained mixed solution was replaced 3 times with rinsing using DI water with rigorous shaking. (d) 3D NFs aqueous dispersions are prepared before freeze drying.



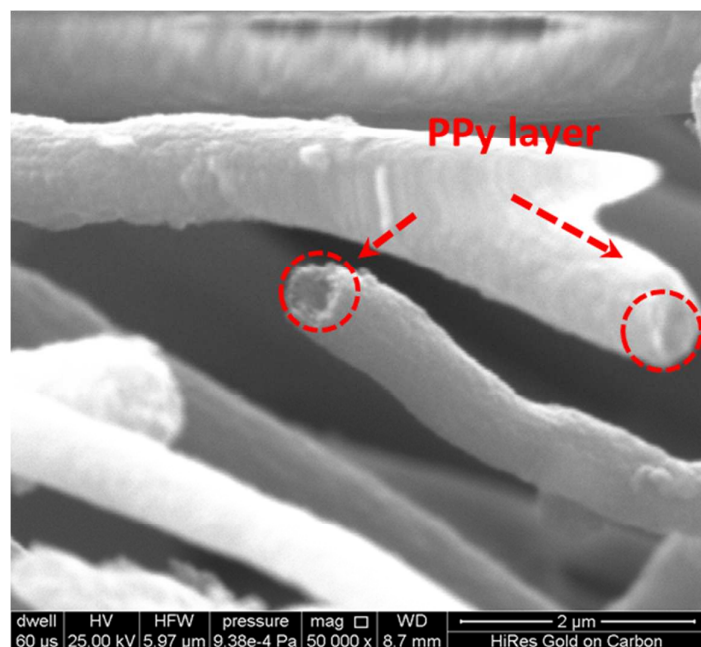
**Figure S2.** Confocal images of the 3D NFs. The nanofibers of 3D NFs were doped with  $\text{CeF}_3\text{:}5\%\text{Tb}$  nanoparticles in the fabrication process (5mg  $\text{CeF}_3\text{:}5\%\text{Tb}$  nanoparticles were dispersed into 1mL precursor solution).



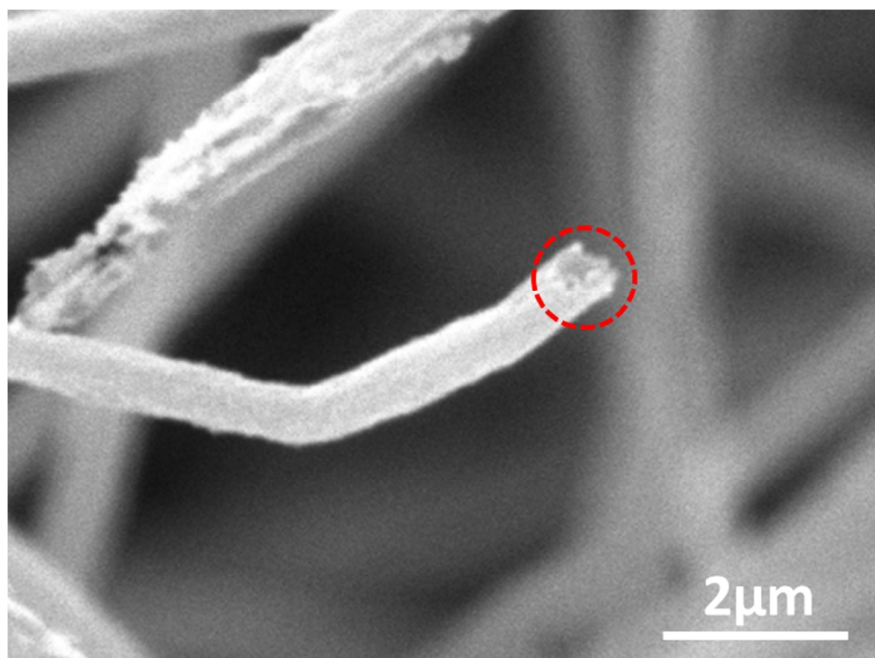
**Figure S3.** BET surface area of the NFMs and the 3D NFs.



**Figure S4.** (a) TEM image and (b) high magnification SEM image of single PPy core-shell nanofiber.

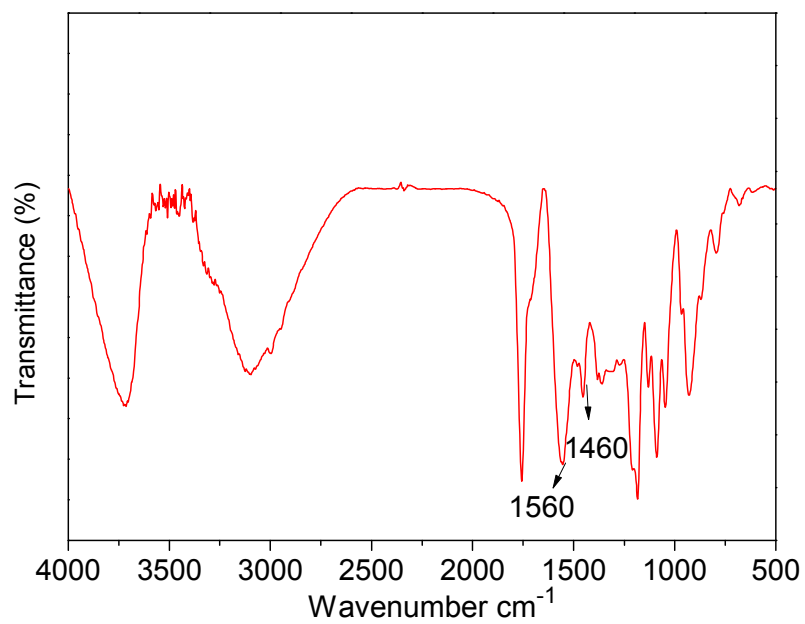


**Figure S5.** SEM image of PPy tubes in the 3D eNFs after removing polymer.

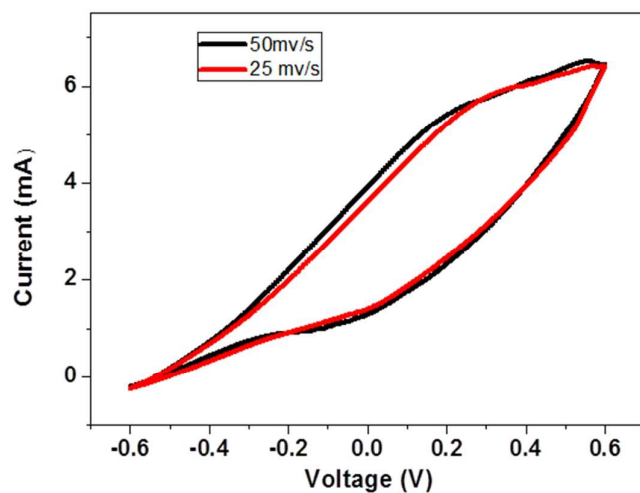


**Figure S6.** SEM image of PPy tubes in the 3D eNFs after carbonization .





**Figure S7.** FTIR spectrum of 3D eNFs.



**Figure S8.** CV curves of 3D e-NFs at scan rates of 50mV/s and 25mV/s.

## REFERENCES

(S1) Jin, L.; Wang, T.; Feng, Z. Q.; Zhu, M.; Leach, M. K.; Naim, Y. I.; Jiang, Q. Fabrication and Characterization of A Novel Fluffy Polypyrrole Fibrous Scaffold Designed for 3D Cell Culture. *J. Mater. Chem.* **2012**, 22, 18321.