**Supporting Information**

**Porous, multi-layered piezoelectric composites based on highly oriented PZT/PVDF electrospinning fibers for high-performance piezoelectric nanogenerators**

*Xiangxin Du* *a, Zheng Zhou a, Zhao Zhang a, Liqin Yao a, Qilong Zhang a \**

*and Hui Yanga*

*a School of Materials Science and Engineering, State Key Lab of Silicon Materials, Zhejiang University, Hangzhou, Zhejiang 310027, PR China*

Mailing addresses:

Xiangxin Du: [xiangxindu@zju.edu.cn](mailto:xiangxindu@zju.edu.cn); Zheng Zhou: [zhouzheng1020@zju.edu.cn](mailto:zhouzheng1020@zju.edu.cn); Zhao Zhang: [617910593@qq.com](mailto:617910593@qq.com); Liqin Yao: [yaoliqin@zju.edu.cn](mailto:yaoliqin@zju.edu.cn);

Hui Yang: [yanghui@mail.hz.zj.cn](mailto:yanghui@mail.hz.zj.cn)

\*Corresponding author. Tel: +86 571 87951408. Fax: +86 571 87953054.

E-mail: [mse237@zju.edu.cn](mailto:mse237@zju.edu.cn)



**Fig. S1** (a)SEM image of the PZT particles; (b) the size distribution chart of ZPT particles.



**Fig. S2** SEM images of the fibers doped with different content of PZT particles and the corresponding fiber diameter distribution.

**Table S1.** Young’s modulus *Emod*, maximum tensile strength *Fmax* and breakage elongation of f-P 0.10 film with different stretching directions and the 10wt.% PZT/PVDF cast film

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Parameters** | | |
| **Samples** (10wt.% PZT) | *Emod* (MPa) | *Fmax* (MPa) | Breakage elongation (%) |
| Fiber film (F⊥fibers) | 227.2 | 8.538 | 262.3 |
| Fiber film (F // fibers) | 499.25 | 22.76 | 128.66 |
| Bulk film | 1614 | 37.82 | 17.675 |



**Fig. S3** Output voltage of the f-P 0.10 fiber-based PENG with a film thickness of 500μm.