Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Supplementary Information

A flexible self-poled piezocomposite nanogenerator based on $H_2(Zr_{0.1}Ti_{0.9})_3O_7$ nanowires and polylactic acid biopolymer

Zouhair Hanani,[a,b,c,*] Ilyasse Izanzar,[a] Soukaina Merselmiz,[a] Taha El Assimi,[a,d] Daoud Mezzane,[a,e] M'barek Amjoud,[a] Hana Uršič,[c] Uroš Prah,[c] Jaafar Ghanbaja,[f] Ismael Saadoune,[a,d] Mohammed Lahcini,[a,d] Matjaž Spreitzer,[c] Damjan Vengust,[c] Mimoun El Marssi,[e] Zdravko Kutnjak,c Igor A. Luk'yanchuk,[e,g] and Mohamed Gouné[b]

[a] IMED-Lab, Cadi Ayyad University, Avenue Abdelkrim El Khattabi, P.B. 549, Marrakesh, 40000, Morocco
[b] ICMCB, University of Bordeaux, 87 Avenue du Dr Albert Schweitzer, Pessac, 33600, France
[c] Jozef Stefan Institute, Jamova cesta 39, Ljubljana, 1000, Slovenia
[d] Mohammed VI Polytechnic University, Lot 660-Hay Moulay Rachid, Ben Guerir, 43150, Morocco
[e] LPMC, University of Picardy Jules Verne, 33 rue Saint Leu, Amiens, 80039, France
[f] IJL, University of Lorraine, 54000, Nancy, France
[g] Department of Building Materials, Kyiv National University of Construction and Architecture, Kyiv, 03680, Ukraine

[*] Corresponding author: e-mail: zouhair.hanani@ijs.si

S1. Effect of HZTO-nw@PDA concentration

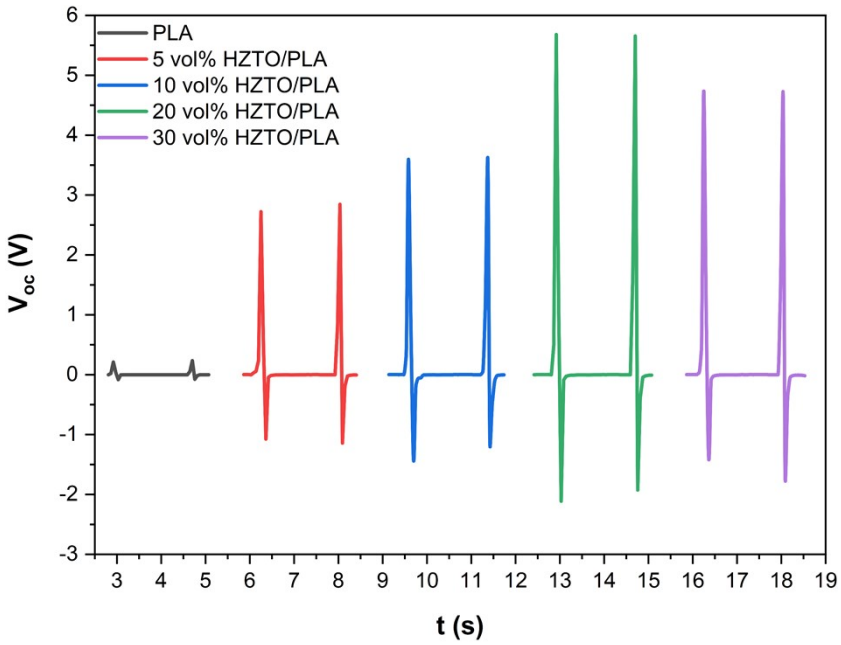

Fig. S1 Output voltage of HZTO-nw@PDA/PLA nanocomposite film-based nanogenerator with different HZTO-nw@PDA concentrations.

S2. Switching polarity test of the nw-PNG

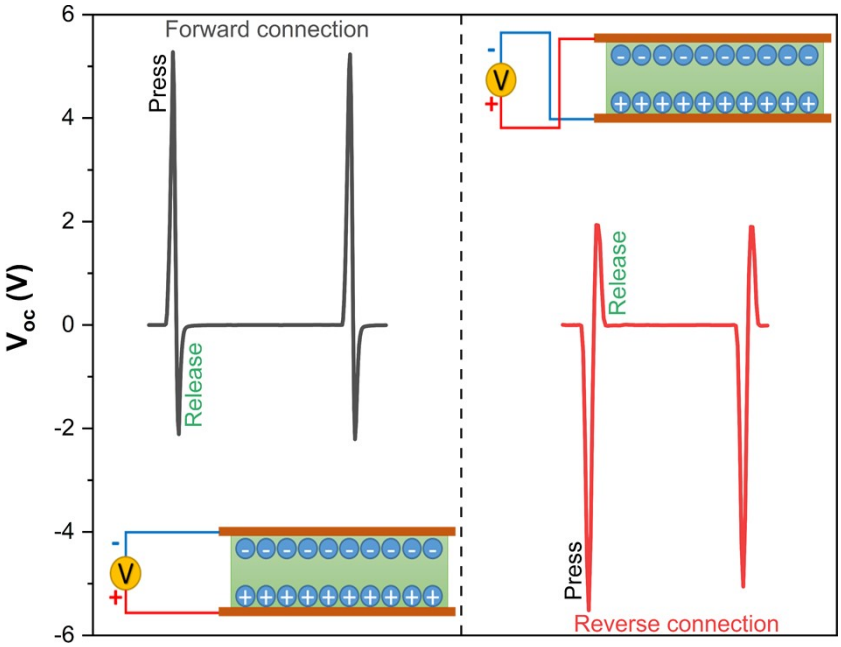

Fig. S2 The generated open-circuit voltage when the external circuit is connected in the forward and reverse directions.

S3. Switching polarity test of the nw-PNG

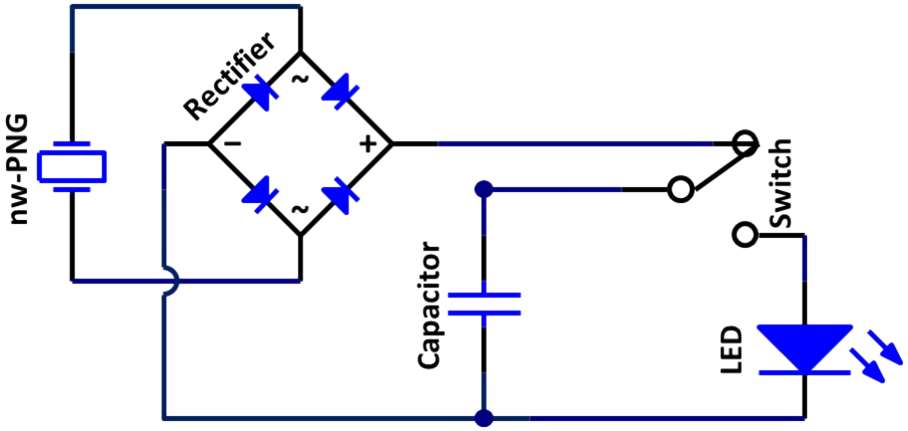

Fig. S3 Schematic circuit diagram for powering the red LED using the nw-PNG.

S4. Supporting videos

- **Video S1:** Lighting a red LED using finger tapping.
- **Video S2:** Lighting a red LED using folding/unfolding motions.