Supporting Information

A Stretchable Encapsulation Material with High Dynamic Water Resistivity and Tissue-Matching Elasticity

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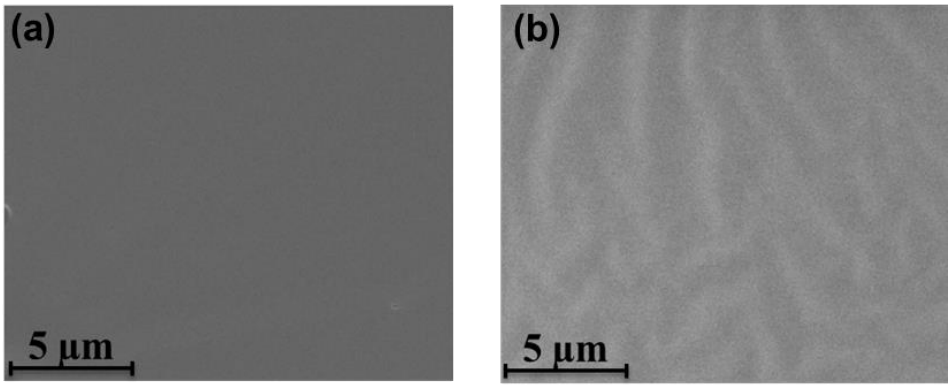

Figure S1 (a) SEM images of top-down the view; (b) SEM images of the cross-section view of PIB blends film (6:4);

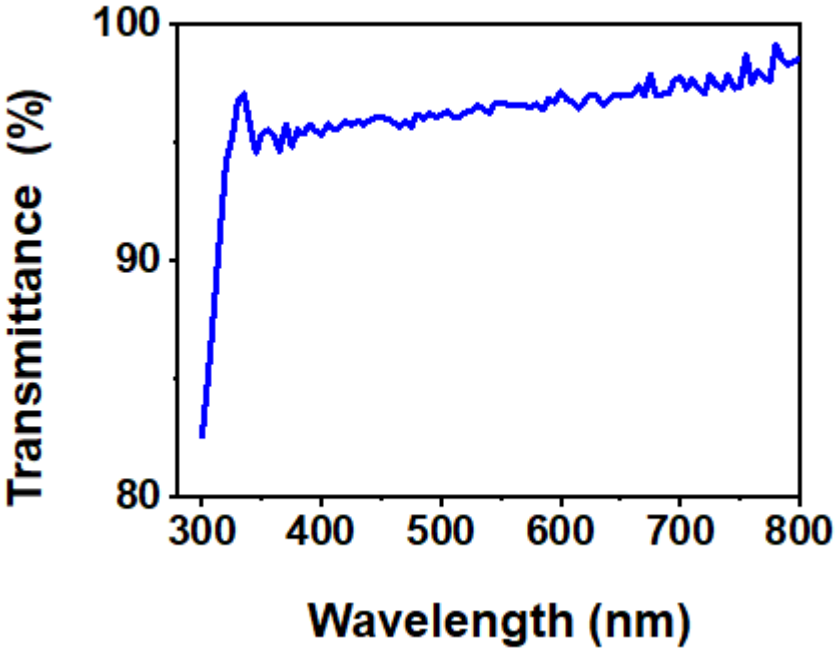

Figure S2. UV-Vis spectrum of the PIB blend film (6:4) showing a >95% transparency in visible light spectrum.

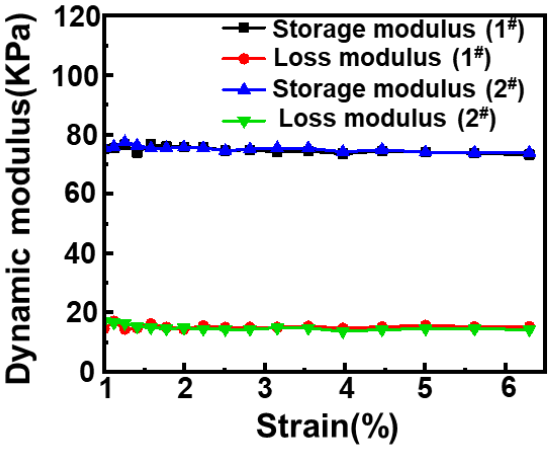

Figure S3 Dynamic mechanical properties of PIB blends film (6:4) testing for two times

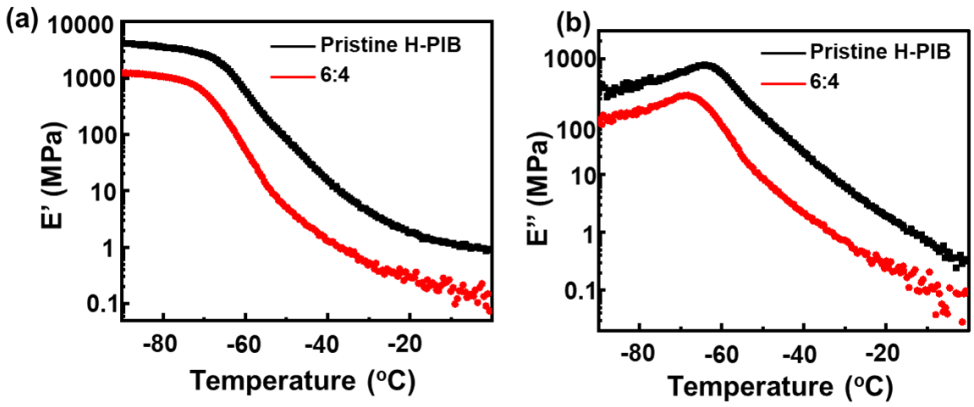

Figure S4 Temperature dependence of (a) Storage modulus; (b) Loss modulus of PIB blend film.

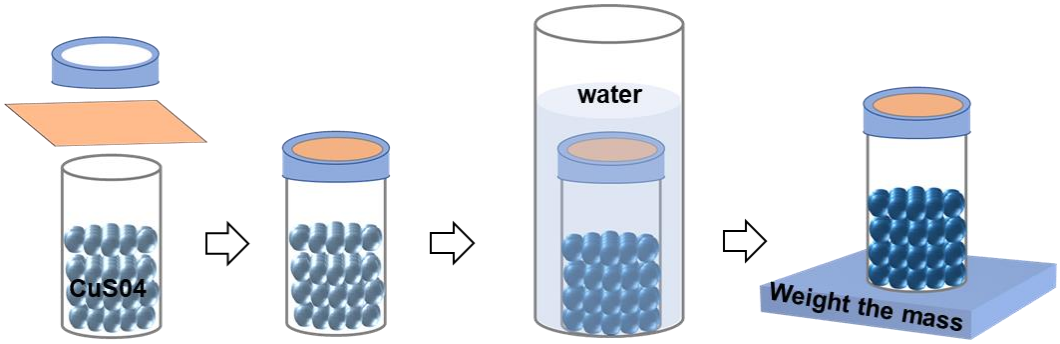

Figure S5 Schematic experimental setup for measuring the water transmission rate.

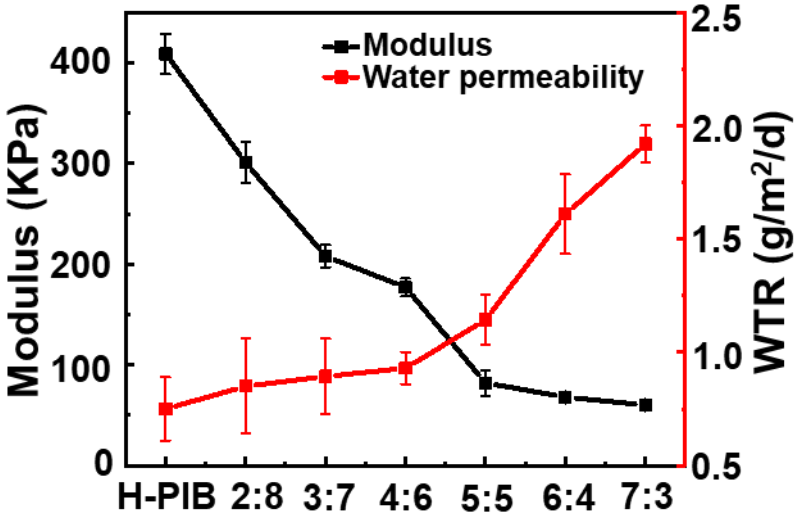

Figure S6. Elastic modulus and water permeability of PIB blend films with different ratios

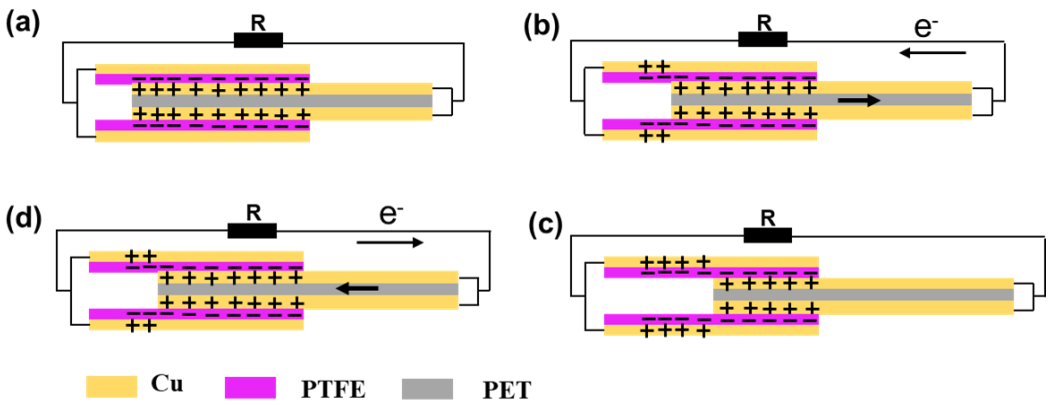

Figure S7 Working mechanism of a sliding mode TENG

In the original position (Figure S7a), the mobile layer and stationary layer fully overlap and intimately contact with each other. Because of their different ability to attract electrons, the triboelectrification effect will induce positive charges to the Cu surface, and negative charges to the PTFE surface. When the device is pulled by an external force, the mobile layer moves out of the stationary layers (Figure S7b). Therefore, the reduce of their overlapping area changes the electrostatic equilibrium of the surface charges, resulting in an electric potential drop between the electrodes. Thus, the electrons are driven to flow from the mobile layer to the stationary layers through an external load and an electrical current is generated. The charge separation continuously increases before the mobile layer reaches the largest distance (Figure S7c), where the current flow is ceased. Subsequently, as the mobile layer slides back (Figure S7d), the transferred charges on the stationary electrode will flow back to keep the electrostatic equilibrium. This will contribute to a current flow with an opposite direction, until the two films reach their original overlapping position. In this cycle, an alternative current wave pulse is produced as the mobile layer slides outwards and inwards.

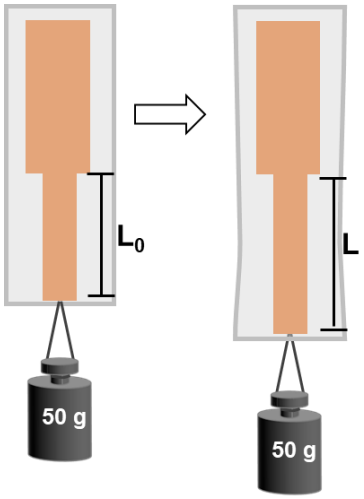

Figure S8 Schematic setup for measuring the voltage output of TENGs packaged by different materials under the same driving force, to show the significance of the materials flexibility.

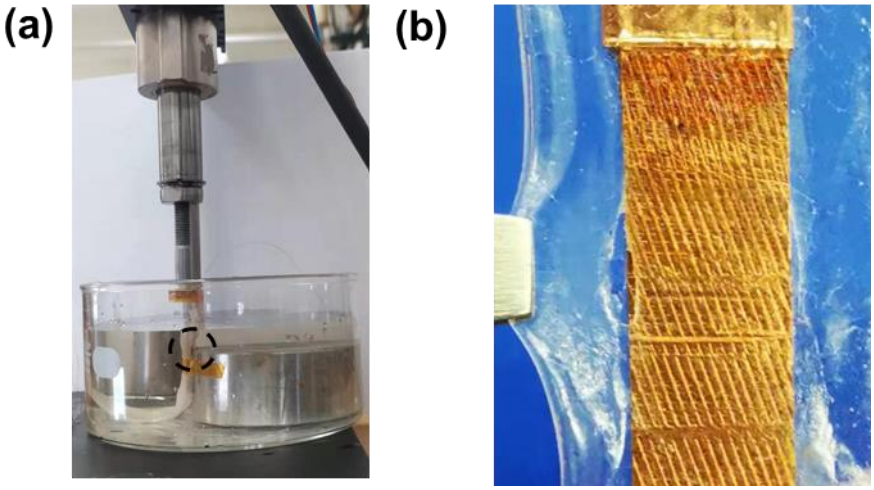

Figure S9 (a) Photograph of the experiment setup for measuring the dynamic stability of packaged TENGs in water. The circled area in (a) is the contact area between the TENG and the anchor base. (b) The contact area that was worn due to the continuous friction during TENG operation.