Supporting Information

Flexible intelligent electromagnetic shielding polymer composite with sensitive on/off switching and high absorption

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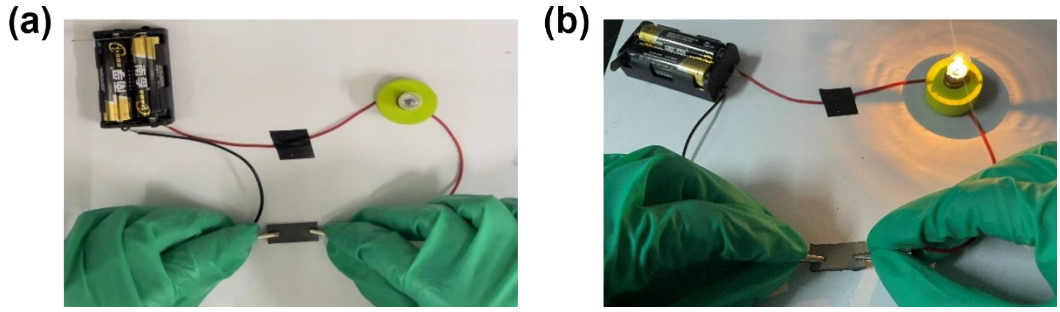

Fig. S1. Experiment on home-made 3V small light bulb circuit of (a) TN15 and (b) TN15A0.12

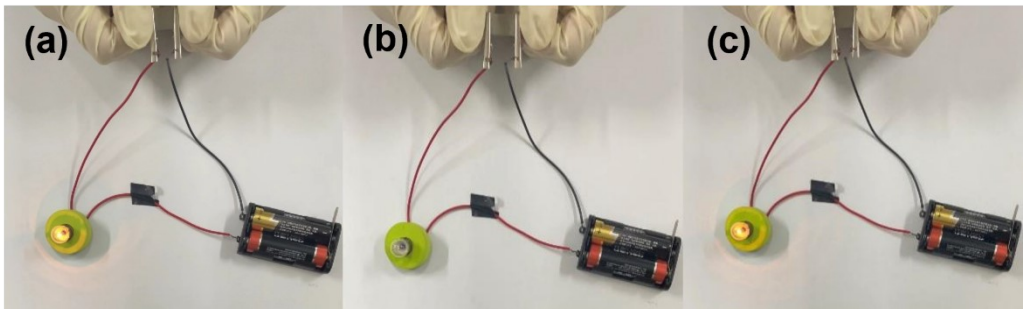

Fig. S2. Dynamic digital photo of the lighted bulb (a) before stretching, (b) in stretching and (c) after stretching.

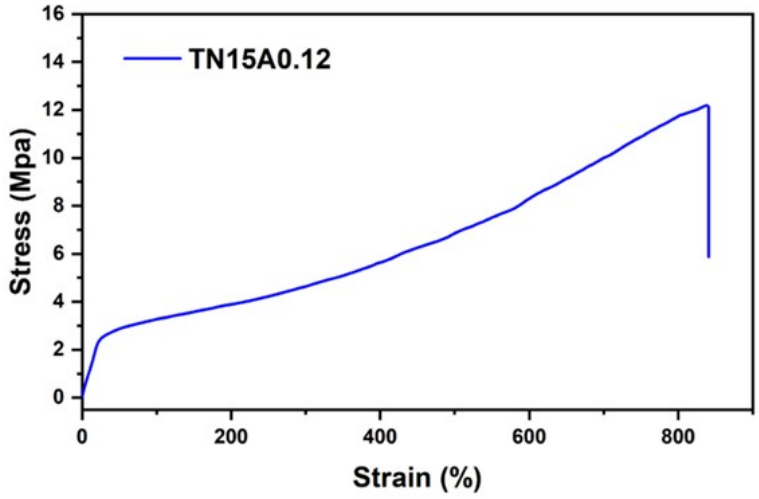

Fig. S3. The maximum stress and strain that material can withstand.

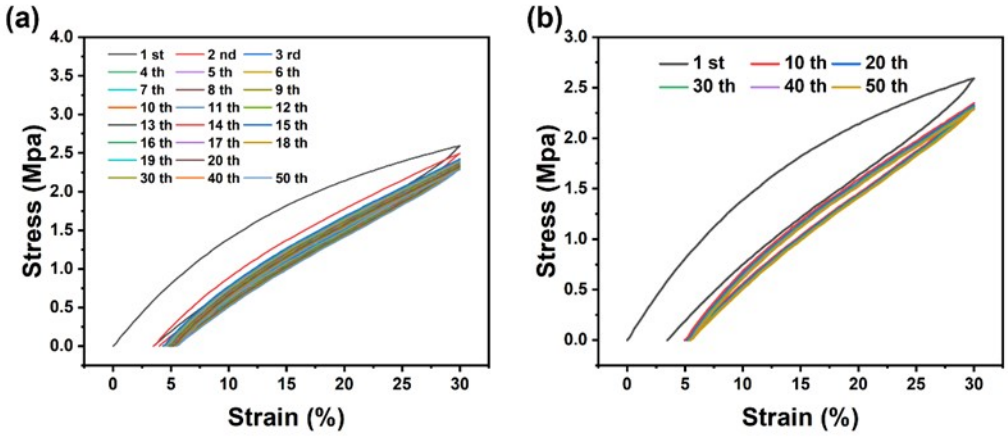

Fig. S4. The fatigue tensile performance. (a) tensile cycle curves for 1-20 cycles, 30th, 40th, and 50th cycles and (b) tensile cycle curves for 1st, 10th, 20th, 30th, 40th and 50th cycles.

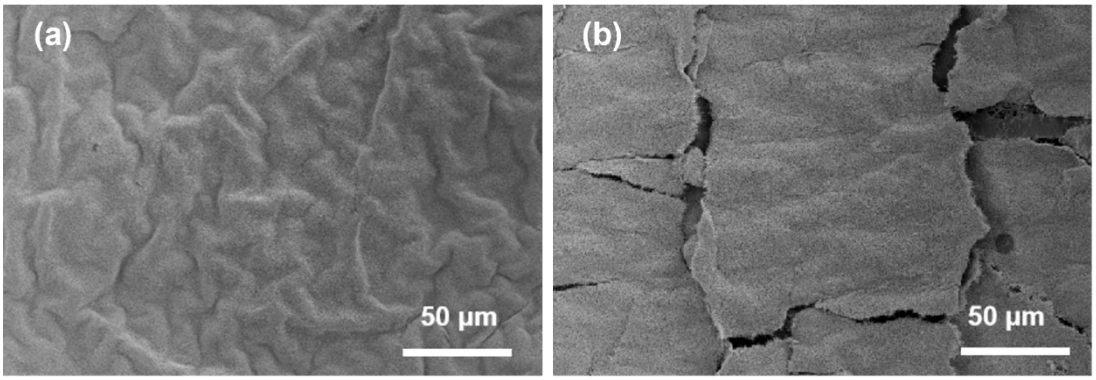

Fig. S5. SEM images of surface in TN15A0.12 composite materials (a) before and (b) after 200 times tensile cycles.

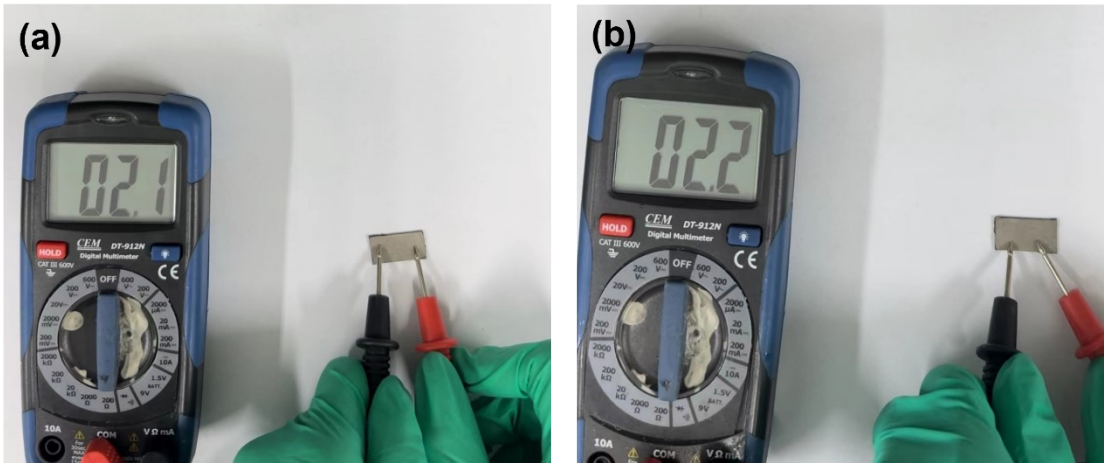

Fig. S6. the surface resistance value of TA layer (a) before irradiated and (b) after irradiated.

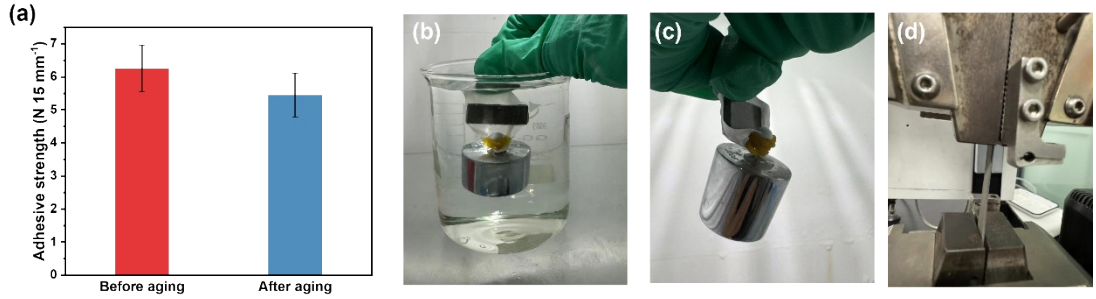

Fig. S7. Adhesive reliability of TA layer and TN layer. (a) Adhesive strength of materials before and after aging, the adhesion of materials (b) after being soaked in water for 36 h, (c) after being irradiated at 45 w/m² for 48h, (d) stretching at much more than 30%.

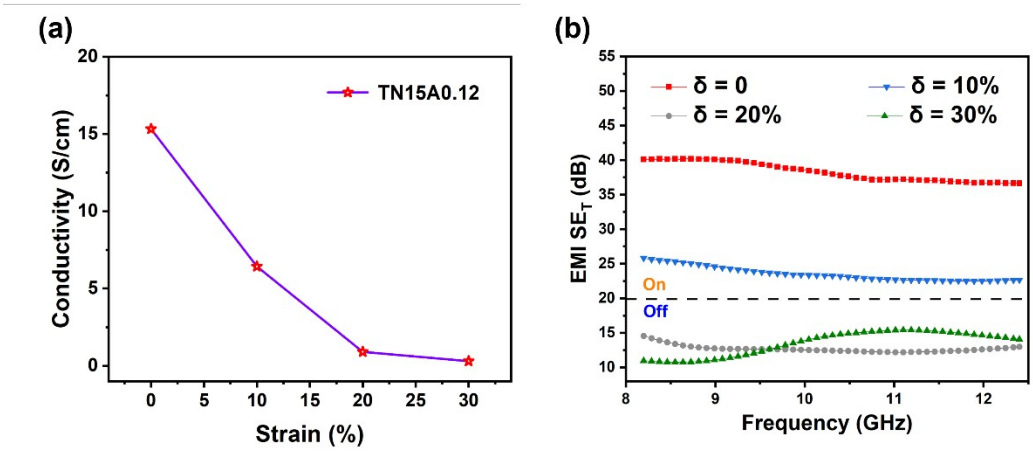

Fig. S8. (a) the conductivity and (b) shielding properties under different strains after 200 tensile cycles.

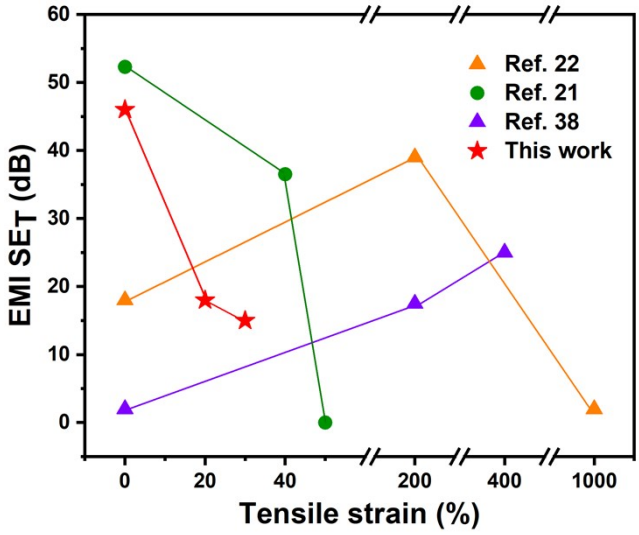

Fig. S9. Comparison of EMI SE$_T$ and tensile strain for other similar composites.

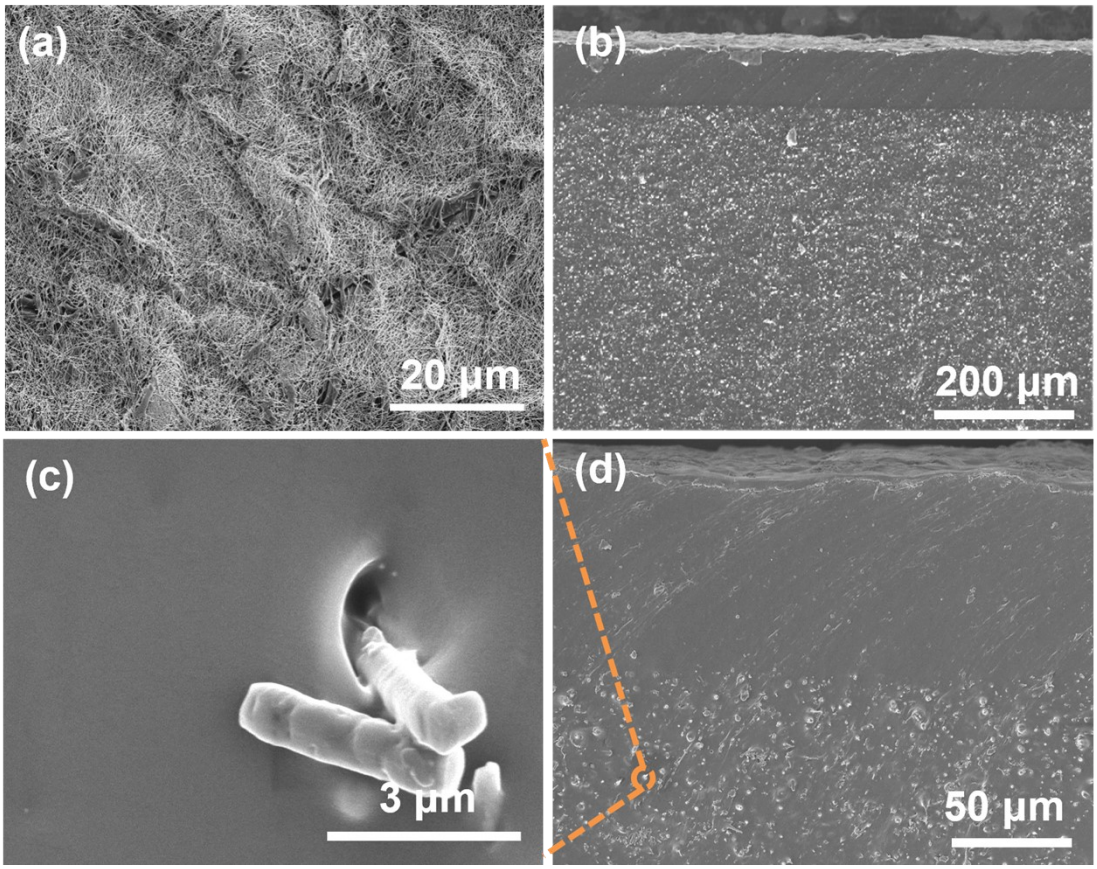

Fig. S10. The SEM image of (a) surface of TA layer, (b-d) cross section of TN3-15A0.12.

The specific process of AgNWs dispersion preparation is as follow:

These syntheses were performed in the dark, due to the photosensitivity of AgCl. A certain amount of $AgNO_3$ aqueous solution (0.1 mol L^{-1}) was mixed with NaCl aqueous solution (0.1 mol L^{-1}) under stirring at 400 rpm for 3 min. Upon NaCl addition, silver chloride immediately flocculated. The precipitate was separated from the supernatant, then washed several time with deionized water and dried under vacuum. After that, 0.6 g of PVP were dissolved into 40 mL of ethylene glycol in a 100 mL three-neck round bottom flask, and brought to 160 °C while stirring at 400 rpm. Once the solution has reached a stable temperature, 30 mg of freshly prepared

AgCl was added, and the solution changes from transparent to light yellow at the same time. After three min, measure 0.22 g $AgNO_3$ into three necked flask and stop the reaction when the solution turns grayish green. Finally, the dispersion was washed multiple times with anhydrous ethanol at 4000 rpm and redispersed to obtain a 0.1 mg mL^{-1} AgNWs ethanol dispersion.

The specific process of Ni@SiCw preparation is as follows:

2 g of SiCw was measured to 20 mL acetone and sonicated for 30 min, and the sonicated sample was added to 17 mL of concentrated hydrochloric acid and standed for 30 min. Subsequently, a 100 mL sensitization solution consisting of 2 g $SnCl_2$, 2 mL HCl and deionized water and a 100 mL activation solution consisting of 0.01 g $PdCl_2$, 1 mL HCl and deionized water were prepared. The coarsened samples were sequentially magnetically stirred at 60 °C for 0.5 h. Finally, a 250 mL three-necked flask was added with the treated sample and the 100 mL of electroless plating solution composed of 8 g $NiCl_2{\cdot}6H_2O$, 7 g $NaH_2PO2{\cdot}\ H_2O$, 7 g NH_4Cl, 8 mL $NH_3{\cdot}H_2O$ and deionized water. After that, the temperature was heated to 70 ° C and mechanical stirring was carried out. When the temperature was stable, 20 mL of 5 mol L^{-1} sodium hypophosphite aqueous solution was slowly added dropwise, and the reaction was stopped after 30 min. The product was washed and filtered with deionized water and absolute ethanol for multiple times, and the Ni@SiCw powder was obtained after vacuum drying for 12 h.