Boron nitride-mediated semiconductor nanonetwork for ultralow-power fibrous synaptic transistor and C-reactive protein sensing

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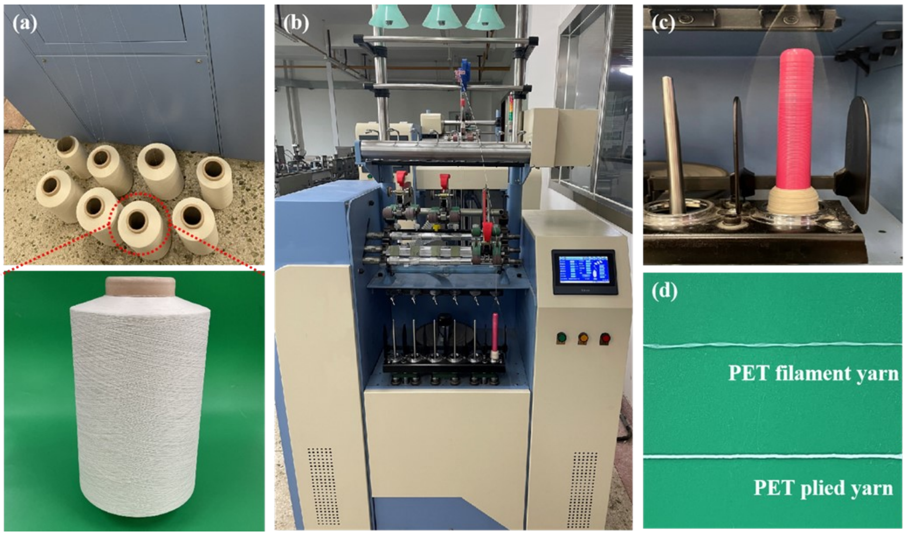

Fig. S1. (a)-(c) the spinning frame machine, eight commercial hydrophobic polyester (PET) filiment yarns (75D/72f) were twisting together to manufacture the PET plied yarn. (d) the photographs of PET filiments and twisted PET yarns.

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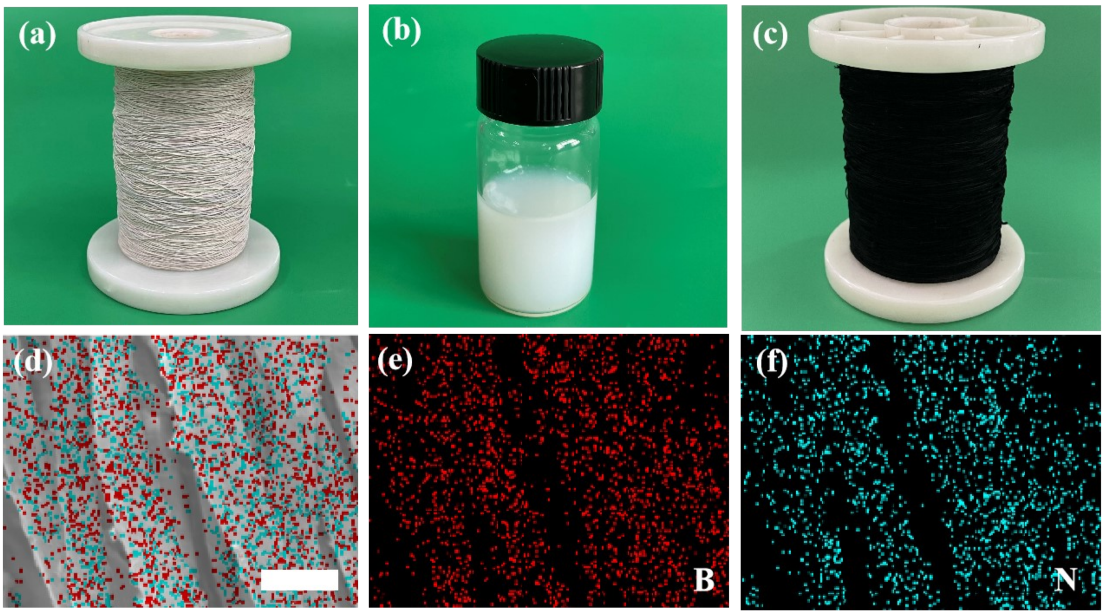

Fig. S2. Optical images of PET (a), FBN colloid solution (b), PPy/FBN/PET electrode (c), optical image of PPy/FBN/PET electrode, (d) the EDS images of FBN/PET electrode, (e) the B element and (f) N element.

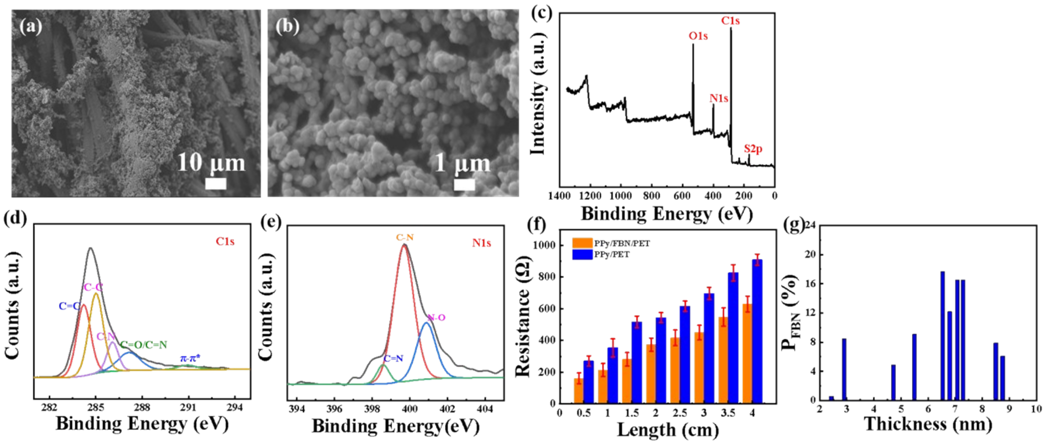

Fig. S3. (a)-(b) SEM images of PPy/PET, (c) XPS survey spectra of PPy/FBN/PET, (d) C1s and (e) N1s spectra.(f) the resistances of PPy/PET and PPy/FBN/PET with different measuring length. (g) FBN sheets counted from their AFM images. The average thickness of FBN is 6.05 nm.

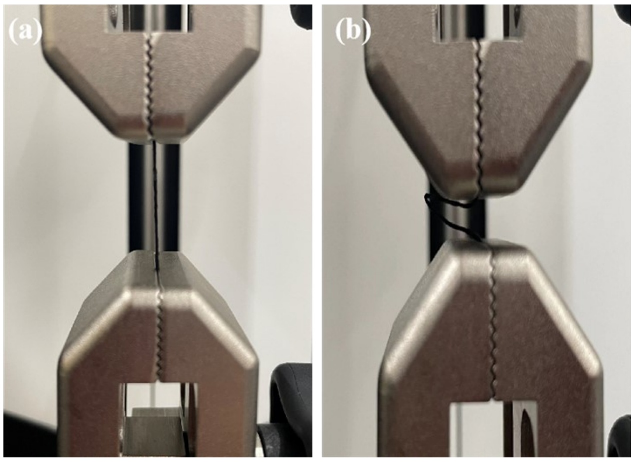

Fig. S4. The bending stability test of PPy/FBN/PET electrode by Mark 10 Force Gauges.

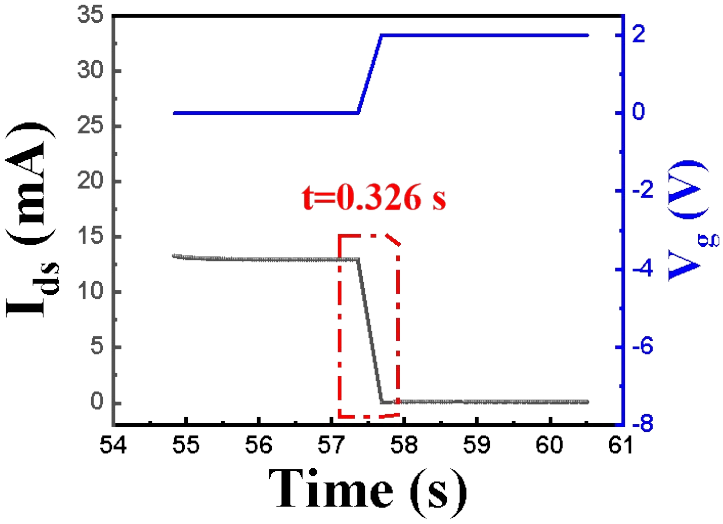

Fig. S5. The tenth switch cycle of FOECT, the response time is 0.326 s.

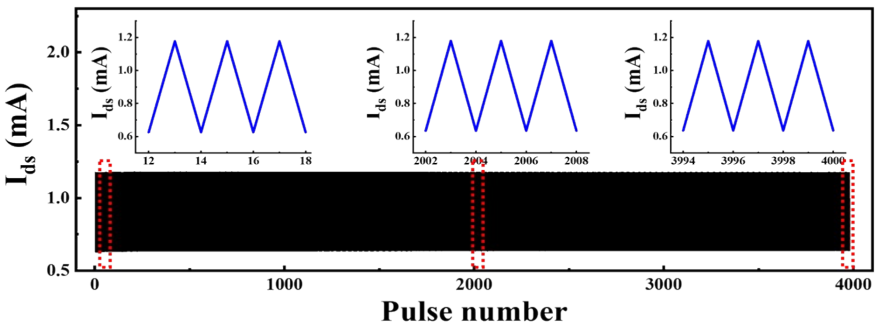

Fig. S6. EPSC stability of synaptic FOECT for 4000 cycles (V_g=1 V, 25 ms)

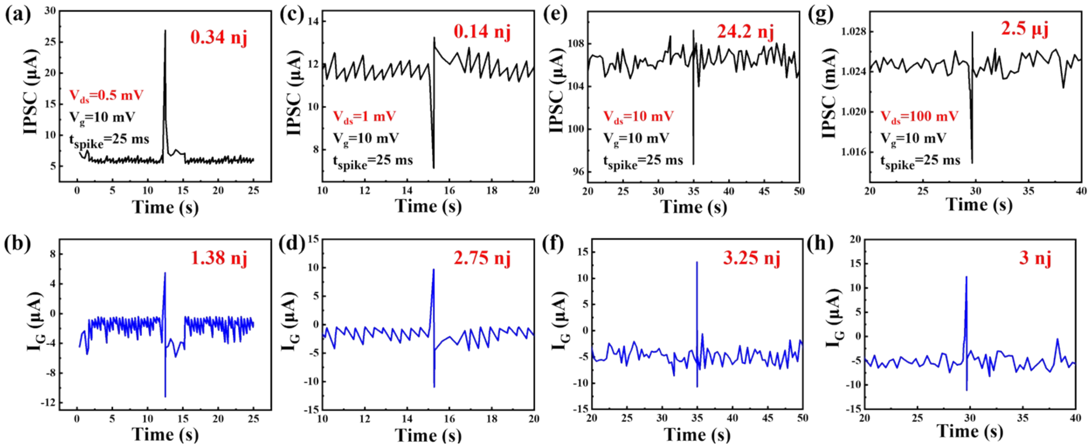

Fig. S7. Power consumption at different V_{ds} (V_g =10 mV, 25 ms). (a) IPSC and (b) gate power consumption at V_{ds} =0.5 mV. (c) IPSC and (d) gate power consumption at V_{ds} =1 mV. (e) IPSC and (f) gate power consumption at V_{ds} =10 mV. (g) IPSC and (h) gate power consumption at V_{ds} =100 mV.

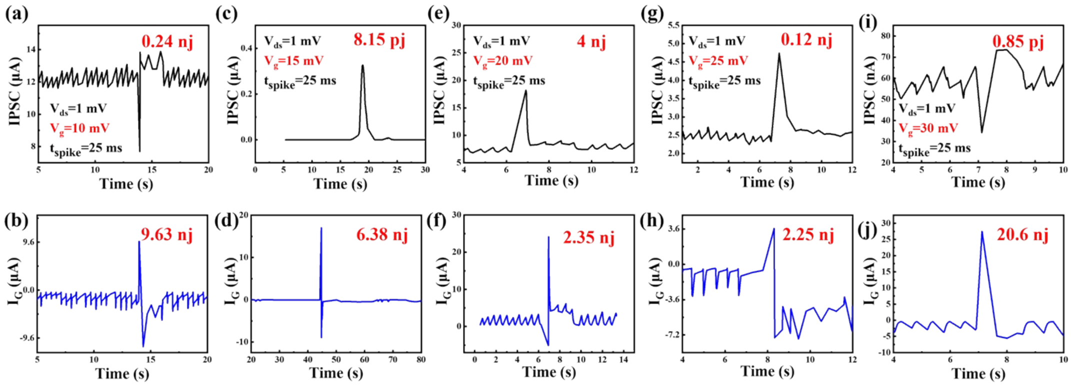

Fig. S8. Power consumption at different V_g (V_{ds} =1 mV, spike width 25 ms). (a) IPSC and (b) gate power consumption at V_g =10 mV. (c) IPSC and (d) gate power consumption at V_g =15 mV. (e) IPSC and (f) gate power consumption at V_g =20 mV. (g) IPSC and (h) gate power consumption at V_g =25 mV. (i) IPSC and (j) gate power consumption at V_g =30 mV.