Supplementary Material

Electronics-free, ultra-low-power, wearable sensor chip for high-frequency electromagnetic field detection

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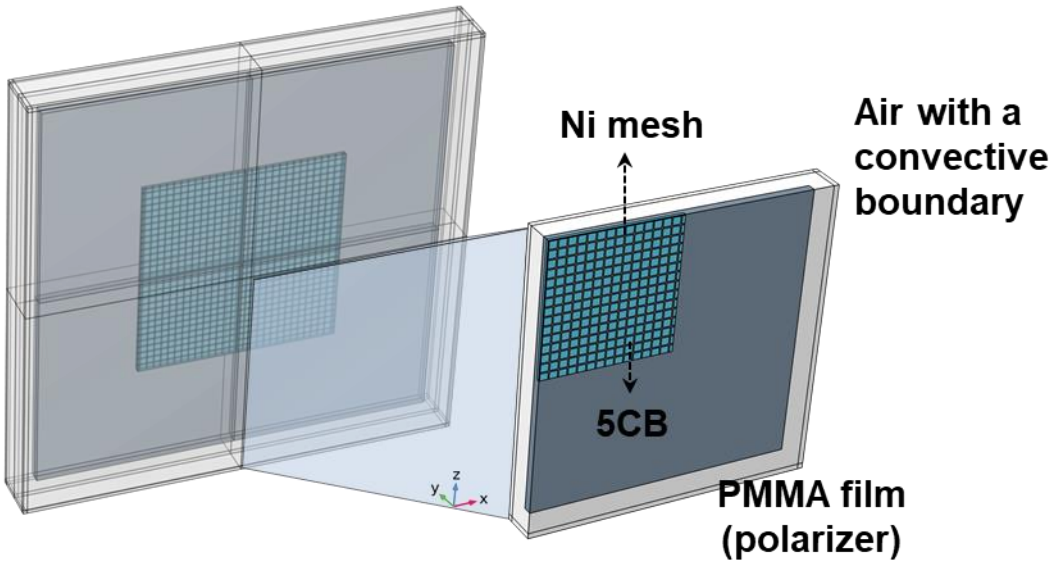

Figure S1: 3D computational domain of the sensor chip used in the COMSOL modeling. The entire geometry was divided into 8 identical segments, where only one segment was used for the simulation study with symmetric boundary conditions. The phase transition of thermotropic liquid crystal (5CB) is driven by magnetothermal effect induced by high-frequency magnetic fields.

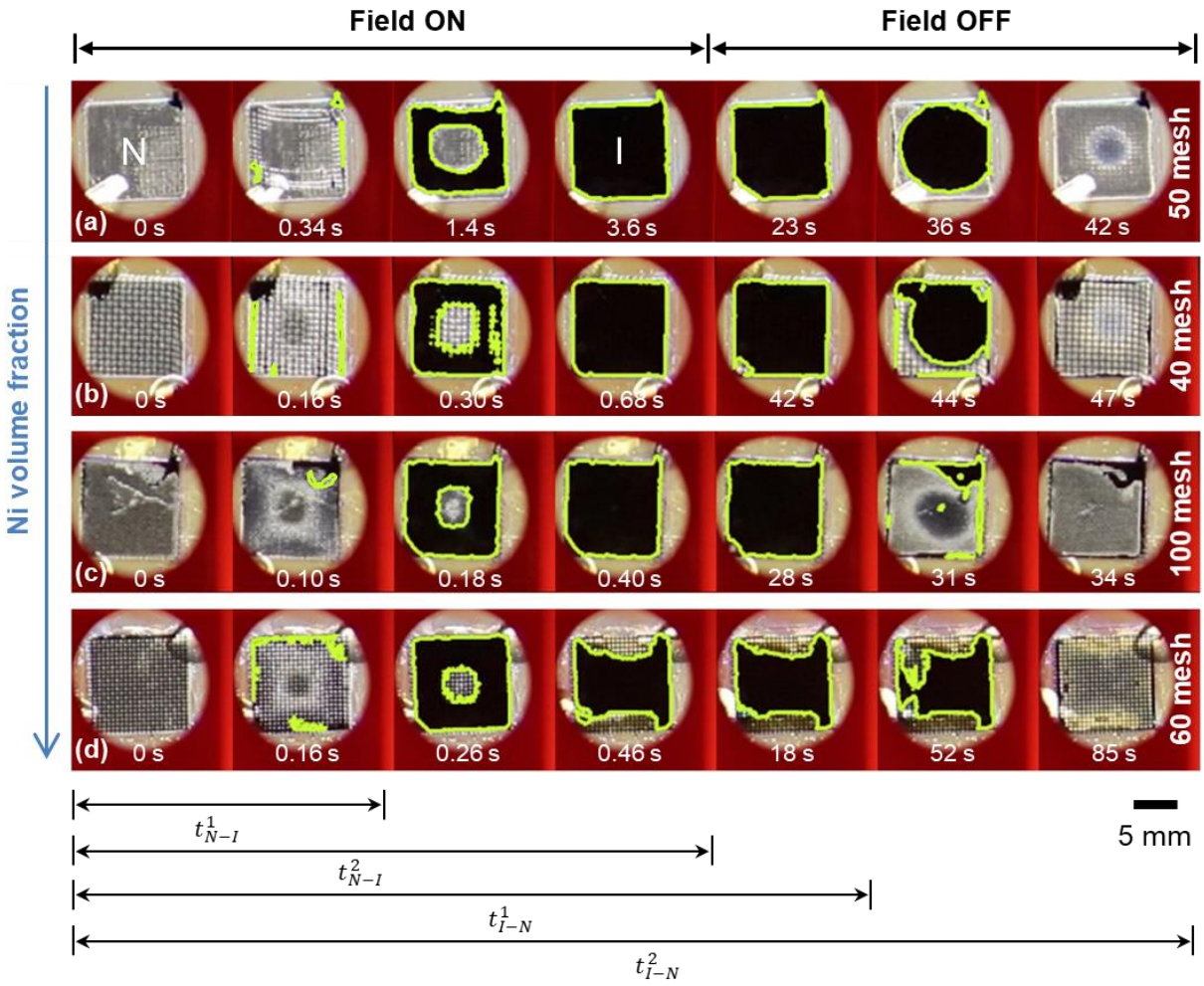

Figure S2: Representative images showing the optical responses of sensor chips (caused by a reversible isotropic-nematic phase transition of thermoresponsive 5CB layer) in different conditions of Ni volume fraction and mesh size. From the upper to lower rows, the Ni volume fraction increases from (a) 0.050 (50 mesh), (b) 0.188 (40 mesh), (c) 0.272 (100 mesh), to (d) 0.301 (60 mesh). [N: nematic phase, I: isotropic phase]

Movie S1: A representative movie demonstrating the operation of a sensor chip under a pulse of high-frequency magnetic field. The field application (the onset represented by an aluminum piece' blow-away) continued for about 10 s. The sensor chip was located on the top of support (in the middle of the Helmholtz coil) and its 90°-reflected images were continuously obtained with time evolution (Fig. 2).