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Supplementary Information for

Electric field control of magnetism in nickel with coaxial cylinder structure at room temperature by electric double layer gating

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Supplementary Figure S1: Specific capacitance for ion gel. The specific capacitance of ion gel sandwiched between two electrodes was measured as a function of frequency.

Before confirming the validity of our device design, we first calibrated the electrochemical window of the device by cyclic voltammetry at room temperature. As demonstrated in Supplementary Fig. S2, the cyclic voltammogram of the device can be divided into three regions according to the current change, Region I (-1.7 V < V < +2.3 V), Region II ($\text{V} \leq -1.7 \text{ V}$), and Region III ($\text{V} \geq +2.3 \text{ V}$). Compared with the cyclic voltammogram obtained by using two Pt electrodes, we can draw a conclusion that the interfacial electrostatic charge accumulation dominates Region I and the electrochemical reaction rate of Ni/Cu wire is restricted in a low range. While in the Region II and III, the electrochemical reaction occurs, which is inferred from the abrupt current increasing.



Supplementary Figure S2: Cyclic voltammograms of the ion gel obtained by using (a) tow Pt wires as electodes and (b) Ni/Cu wire and Pt wire as electrodes. The potential scan rate is 4 mV/s. According to the current, the range of the voltage was divided into Region I and II.



Supplementary Figure S3: Magnetic moment measurement. The magnetism switching of the devices before and after charging at 2.0 V voltage for one hour, and then discharged for one night through the spontaneous charge relaxation in the ion gel.



Supplementary Figure S4: Results of different amount of wires inserted samples. Magnetism changing of (a) one, (b) ten, (c) twenty and (d) thirty wires inserted samples for charging, respectively.



Supplementary Figure S5: The changes of magnetic moments of (110) and (100) structure. The changes of the magnetic moments are about (a) 1.75% for (110) structure and (b) 2.54% for (100) structure. The solid blue lines are linear fits to the calculated data.