Electronic Supplementary Information (ESI) for

Controllable fabrication and magnetic-field assisted alignment of Fe_3O_4-coated Ag nanowires via a facile co-precipitation method

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Preparation of Fe_3O_4-coated Ag-NW films on polyimide membrane. From Fig S1a, it can be seen that the Fe_3O_4-coated Ag NWs are homogeneously dispersed in the ethanol solution. When two permanent magnets are put close to the solution, the suspensions of Fe_3O_4-coated Ag NWs are immediately attracted by the magnets as shown in Fig. S2b, suggesting that the Fe_3O_4-coated Ag NWs possess excellent water solubility and magnetic responsibility.

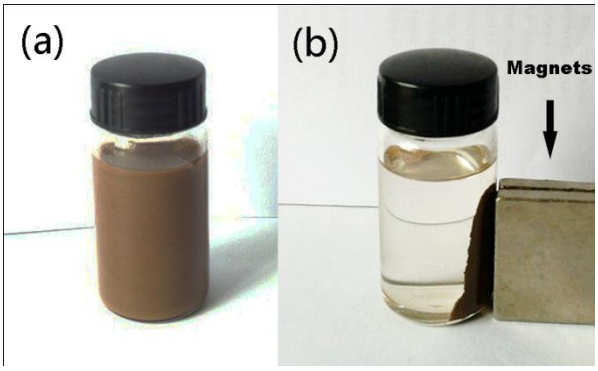

Fig. S1 Digital photos of the ethanol solution containing Fe_3O_4-coated Ag NWs (MR=0.1:1): (a) before and (b) after placement of permanent magnets.

To measure the electrical conductivity of Fe_3O_4-coated Ag NWs, Fe_3O_4-coated Ag NW films are prepared using the polyimide (PI) membrane as the substrate as shown in Fig. S2. The Fe_3O_4-coated Ag NW solution is first cast onto the surface of the PI membrane and kept at room temperature for 24 h until the solvent is dried. The

Fe_3O_4-coated Ag NW films are then taken out from the steel mould for the electrical conductivity measurement. The thickness of Fe_3O_4-coated Ag NW films is obtained from that of the Fe_3O_4-coated Ag NW film plus PI membrane reduced by that of the PI alone. The thickness is then used for the estimation of electrical resistivity.

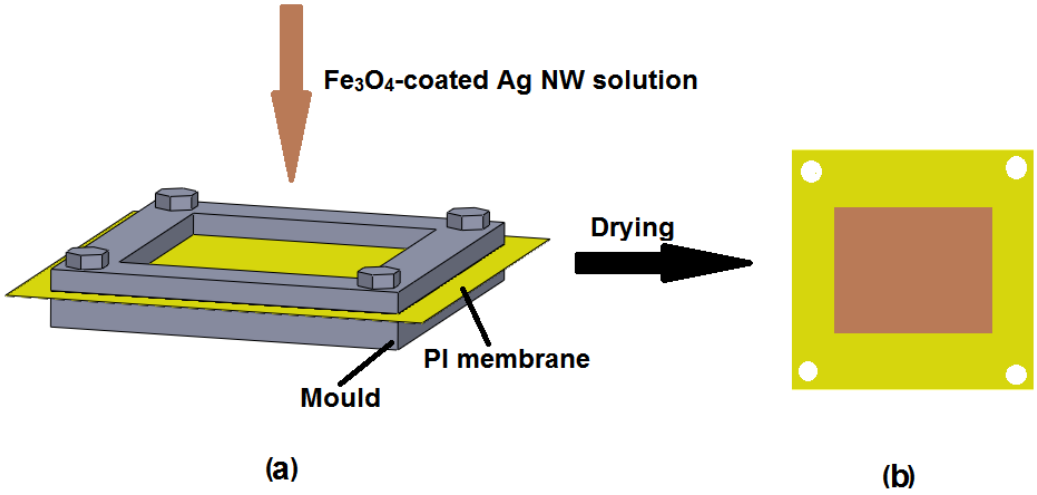

Fig. S2 Schematic showing for preparation of Fe_3O_4-coated Ag NW films on the PI membrane.

Characterization of aligned Fe_3O_4-coated Ag NW/polyvinylalcohol (PVA) composite film. The oriented alignment behavior of Ag NWs in the Fe_3O_4-coated Ag NW/PVA composite film (MR = 0.1:1 and Ag NW content = 2 wt% in the composite) is shown in Fig. S3. Fig S3a shows that the un-coated Ag NWs are randomly distributed in the PVA matrix. The Fe_3O_4-decorated Ag NWs are impelled to each other to allow them to align along the direction of magnetic force line under an external magnetic field as indicated by the arrows in Fig. 3Sb. This oriented alignment behavior leads to a high anisotropy of electrical resistivity (ρ) for the composite film (see Fig. S3c).

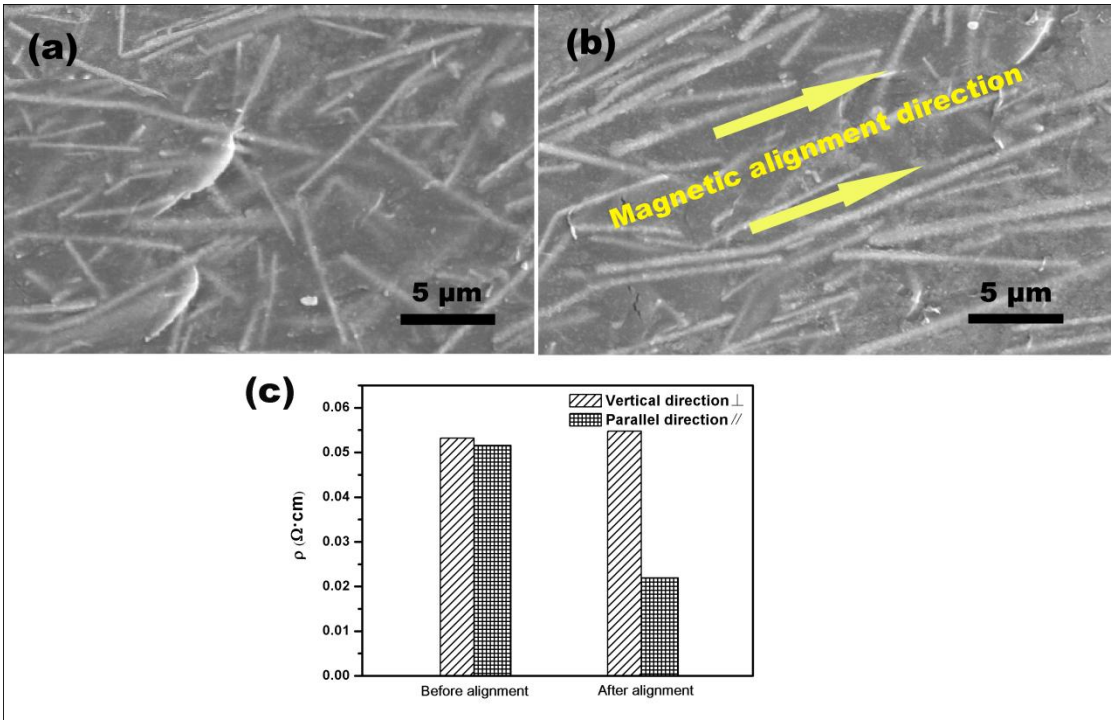

Fig. S3 SEM images (a) before and (b) after magnetic field alignment and (c) electrical resistivity of the Fe_3O_4-coated Ag-NW/PVA composite film, in which MR=0.1:1 and Ag NW content = 2 wt% in the composite. The direction of the magnetic alignment is indicated by the arrows.