

Supplementary Material

Surface plasmon enhancement in the different spatial distributions of nanowire and two-dimensional material

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Section S1. SEM images of Ag nanowires.

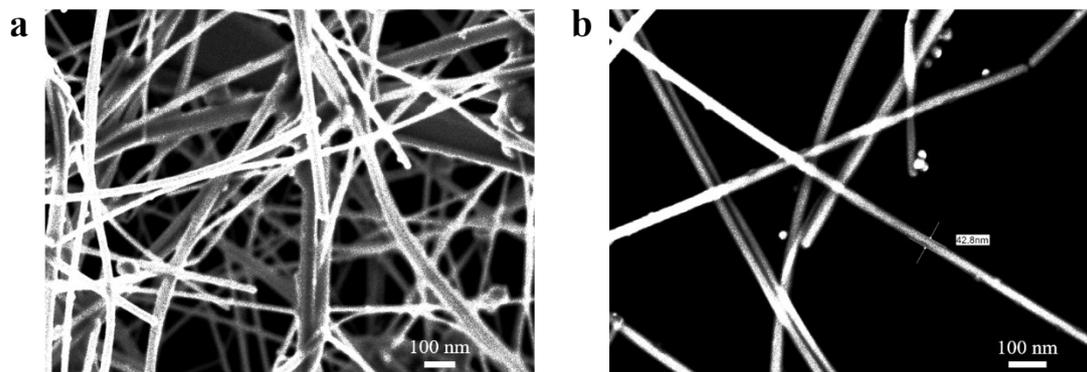


Figure S1. SEM images of Ag NWs synthesized by the polyol method.

Section S2. Fabrication process of the Ag/MoS₂ structures.

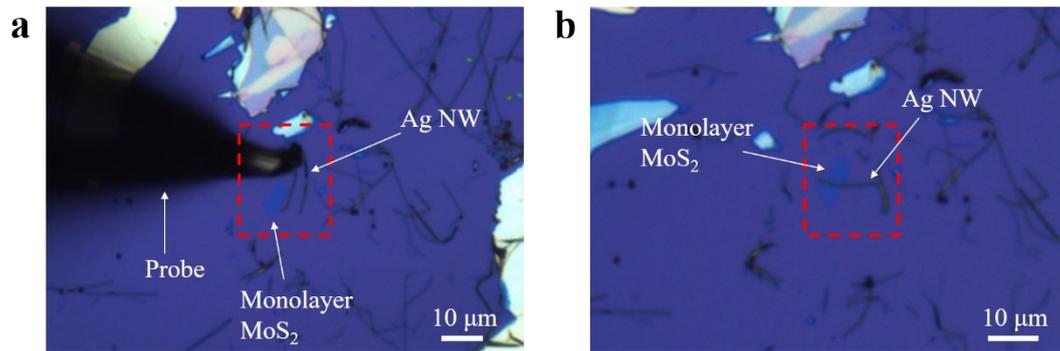


Figure S2. Optical microscope (OM) images of dragging an Ag NW onto the top of 1L MoS₂ with a probe of a probe station. The red dashed frame is the operating area of the samples.

Section S3. Photoelectric performance of the pristine 1L MoS₂ phototransistor

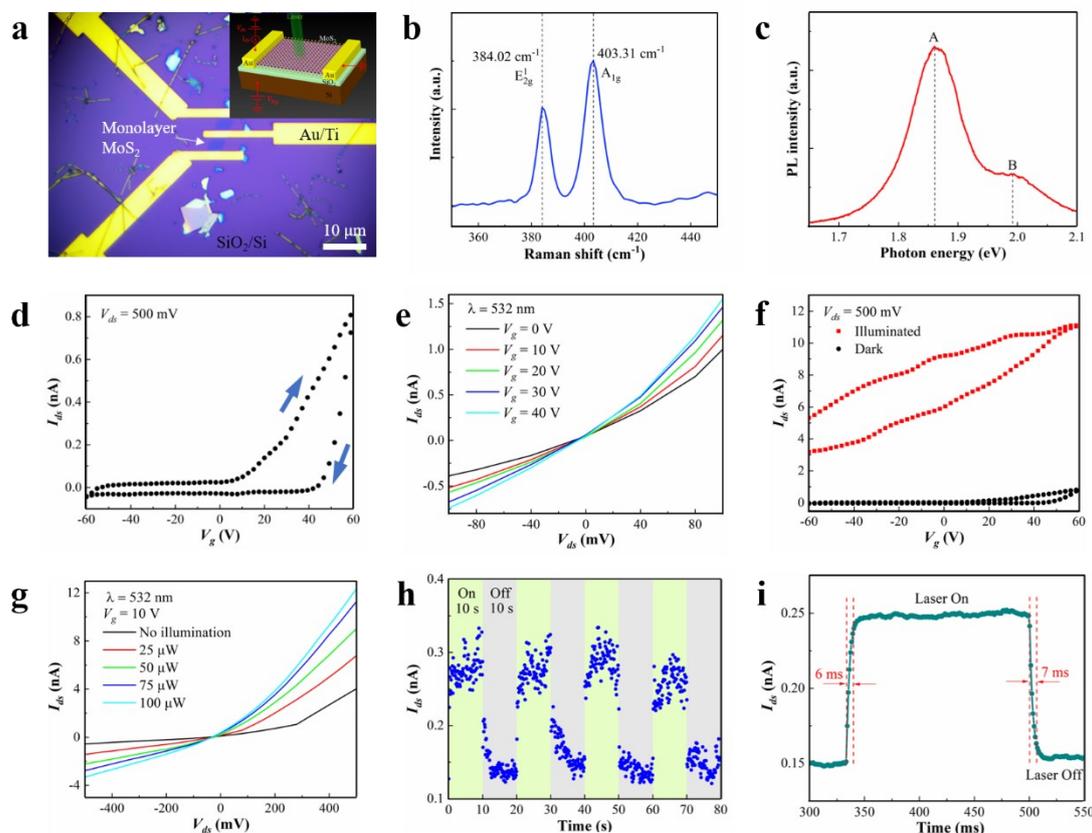


Figure S3. Photoelectric performance of the pristine 1L MoS₂ phototransistor. (a) OM image of the pristine 1L MoS₂ phototransistor, the inset is a schematic diagram of the photoelectric measurement of it. (b) Raman spectrum of the 1L MoS₂ in the channel. (c) PL spectrum of the 1L MoS₂ in the channel. (d) Transfer characteristic curve without light. (e) Output characteristic curves under light. (f) Transfer characteristic curves with and without light. (g) Output characteristic curves under the light of different power. (h) Optical switching response of photocurrent with time. (i) Time-resolved photo response speed.

Figure S3a shows the OM image of the phototransistor based on the pristine 1L MoS₂ that exfoliated in the same batch, the upper right inset is a schematic diagram of the photoelectric measurement of it. Figure S3b shows the Raman spectrum of the

MoS₂ sample in the channel. The peak position of E_{2g}¹ was 384.02 cm⁻¹, and the peak position of A_{1g} was 403.31 cm⁻¹. The peak position difference between them was 19.29 cm⁻¹, which is less than 20 cm⁻¹, indicating that the sample was a monolayer MoS₂.^{1,2} Figure S3c shows the PL spectrum of the MoS₂ sample in the channel. The spectrum had two significant luminescence peaks near 1.86 eV and 1.99 eV, which further proved that the sample was a monolayer MoS₂.³ The transfer and output characteristic curves in Figure (S3d, e) indicated that the V_g had a modulating effect on the carrier concentration and an ohmic contact was formed. According to the data shown in Figure (S3f, g), The photoresponsivity and photo detectivity of the pristine 1L MoS₂ phototransistor were calculated as 0.10 mA/W and 2.5×10⁴ Jones, respectively. A reliable switching behavior can be observed with an on/off time of 10 s, as shown in Figure (S3h). In addition, Figure S3i shows that the rising edge and descending edge of the pristine 1L MoS₂ phototransistor were 6 ms and 7 ms, respectively, which was consistent with the photo response speed of the 1L MoS₂ photodetector reported in the relevant literature.^{4,5}

Supplementary References

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