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Supporting Information

Active control of terahertz plasmon-induced transparency in the hybrid metamaterial/monolayer MoS2/Si structure

Jie Ji,[a] Siyan Zhou,[b] Weijun Wang,[a] Furi Ling,[*a,b] and Jianquan Yao,[a,c]

[a]*Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan 430074, China.*
[b]*School of Optical and Electronic Information, Huazhong University of Science and Technology, Wuhan 430074, China.*
[C]College of Precision Instrument and Optoelectronics Engineering, Tianjin University, Tianjin 300072, China

lingfr@126.com

1. Method for the deposition of Monolayer MoS_2 film

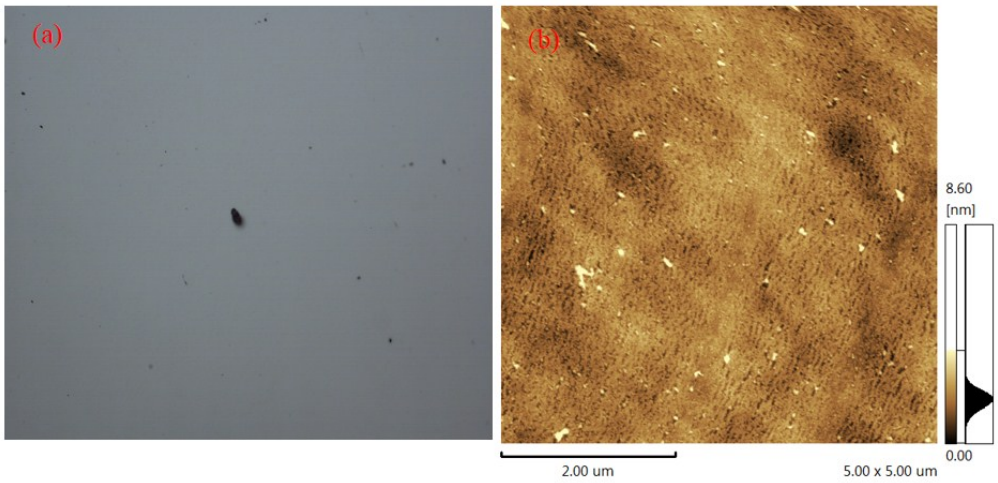
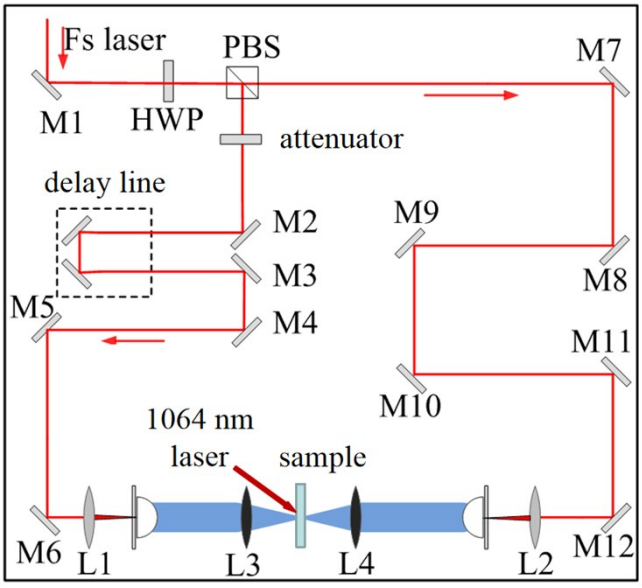


Figure S1. (a) optical micrograph of large scale of monolayer MoS_2 film. (b) AFM image of the monolayer MoS_2, the measured scale is $5\text{um} \times 5\text{um}$.

The monolayer MoS2 was grown by CVD in 80 mm quartz tube furnace with double temperature zone. In the process, MoO3 (99.999% purity) was used as molybdenum source, and solid sulfur (99.999% purity) was used as sulfur source. MoO3 and sulfur were heated to 650 ºC and 180 ºC, respectively. In addition, Ar was used as growth carrier gas with pressure 4000 Pa. After 10 minutes deposition, monolayer MoS_2 film was grown on silicon as shown in Figure S1. The monolayer MoS_2 presenting triangular dimension of few tens of microns covered the underlying substrate with $10 \times 10mm^2$, thus the lateral dimensions of the MoS_2 film is 10 mm.

2. Terahertz time-domain spectrometer system



3. Figure S2 Schematic diagram of the THz-TDS system.

The schematic diagram of time domain terahertz spectroscopy system used in our experimental work was displayed in Figure S2 . The THz time-domain spectrometer (THz-TDS) system produced

by Zomega Terahertz Corporation (USA) was used to measure the transmittance spectra of the films. In the THz-TDS system, M1-M12 was reflective mirror and the delay line was composed of two reflective mirror. L1-L4 were polyethylene lenses. A fiber femtosecond laser beam was divided into two beams by a polarized beam splitter (PBS). The two beams were named the pump beam and the probe beam, respectively. A HWP was placed to change the ratio between the pump beam and the probe beam. After passing through the attenuator and reflected by mirrors, the pump beam was focused on a GaAs photoconductive antenna for the generation of THz waves by lens L1. Meanwhile, the probe beam was focused into a GaAs crystal for the detection of the THz wave by lens L2. Confocal polyethylene lenses L3 and L4 were used to collimate and focus the emitted THz radiation onto the sample which was placed at the focus of L3 and L4. The transmitted THz wave was collected and focused on the GaAs crystal with two polyethylene lenses. The detectable frequency range was from 0.1 THz to 1 THz (3.3 cm^{-1} to 33 cm^{-1}). The frequency resolution was 4.5 GHz. In addition, the diameter of the spot size for probe and pump are 25 mm and the spot radius on the samples was 4 mm. An all-solid-state laser (center wavelength, 1064 nm) was employed for external optical pumping in this experiment. The infrared light was obliquely incident upon the film at 60°, and the temperature of the system was maintained at 18 °C (291 K) during measurement.