SUPPORTING INFORMATION

Photocurrent conversion capability of 2D WS_2-polyvinyl alcohol matrix and their DFT-based charge carrier dynamics analysis

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1. Device fabrication

First glass substrate was cut into the desired shape and size. This glass substrate was cleaned by ultrasonication by lab reagent followed by acetone for removing the residual impurities from the substrate. Finally previously synthesized WS_2 PVOH solution was drop casted on this glass substrate and dried at room temperature in a desiccator. After drying for the electrical measurements silver paste electrodes was put on the device and again dried it at room temperature.

2. Characterization techniques

For the surface morphological analysis Scanning electron microscope of JEOL (Model: JSM 6490 LV), Japan was used. For the structural analysis X-ray diffractometer of Bruker (Model: D8 Advance Eco), Germany was used. For analysis of absorbance properties of the materials UV-Visible spectrophotometer of Thermo-Scientific (Model: Evolution 201) was used. For the analysis of particle size distribution and Zeta potential Malvern Nanozetasizer (Model: NZS90),

UK was used. For the analysis of fingerprints of functional groups Fourier Transform Infrared Spectrometer of Thermo- Scientific (Model: Nicole 6700), USA was used. For the experimental analysis of the photodetection an optical enclosure containing a UV light source of wavelength centered at 365 nm was used. Optical illumination intensity was measured with the help of Newport optical power meter. For the electrical measurements Keithley (Model: 6517B) source meter/ electrometer was used.

3. DFT Analysis

3.1 Infrared analysis

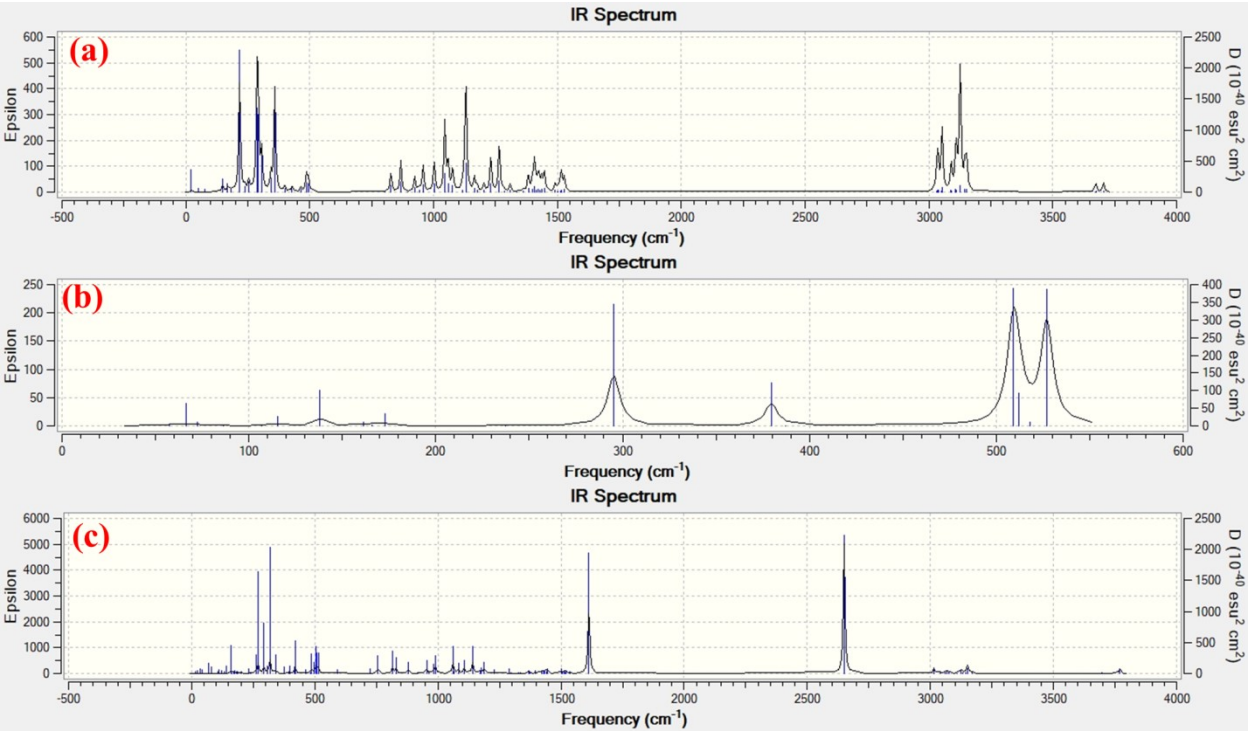

Fig. S1. Infrared spectrum of (a) PVOH (b) WS_2 (c) WS_2 PVOH

3.2 Raman analysis

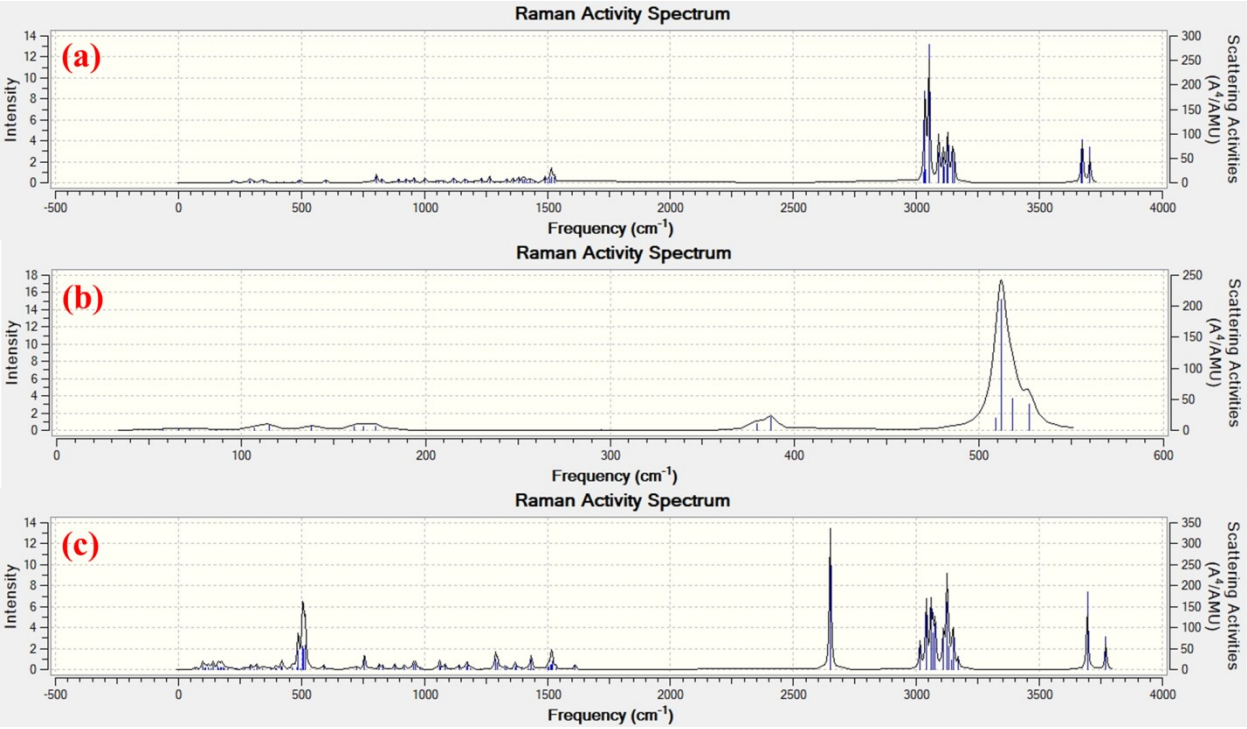

Fig. S2 Raman spectrum of (a) PVOH (b) WS_2 (c) WS_2 PVOH

3.3 P-depolarization

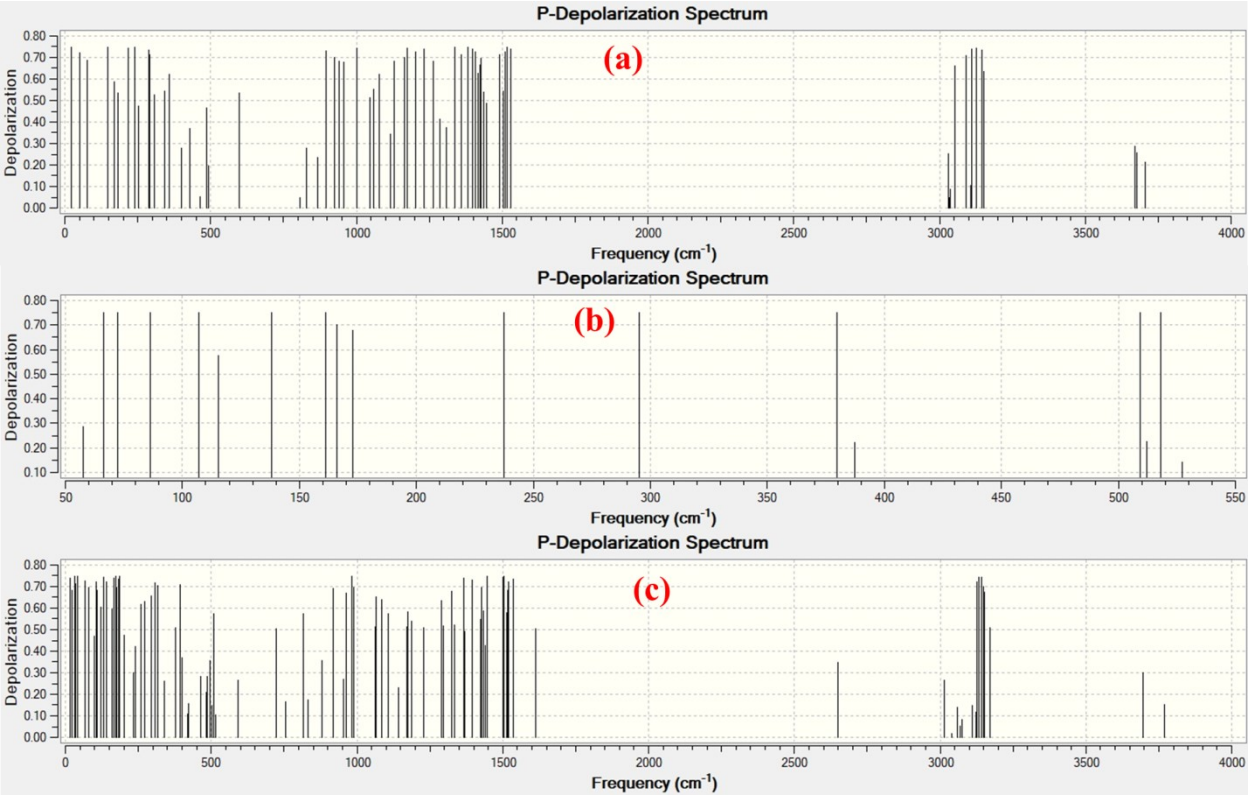

Fig. S3 P-depolarization of (a) PVOH (b) WS_2 (c) WS_2 PVOH

3.4 U-depolarization

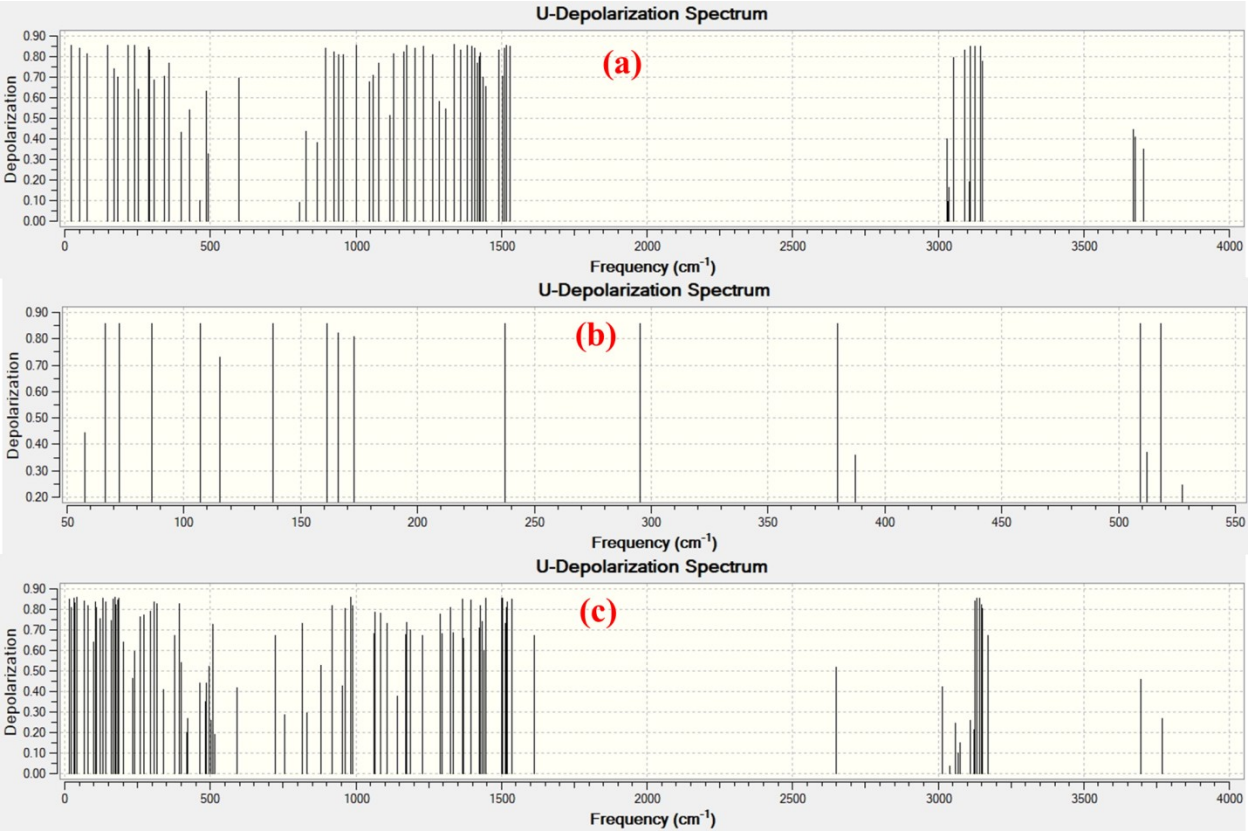

Fig. S4 U-depolarization spectrum of (a) PVOH (b) WS_2 (c) WS_2 PVOH