Supplementary Information

Metal free MoS_2 2D sheets as peroxidase enzyme and visible-light-induced photocatalyst towards detection and reduction of Cr(VI) ion

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1 Characterization

The crystallinity of the synthesized MoS_2 sheets was investigated by analyzing the X-ray diffraction (XRD) analysis using Rigaku X-ray diffractometer (model: ULTIMA IV, Rigaku, Japan) with the scanning rate 3^o min^{-1} at 2θ value 5-90^o with Cu-Kα X-ray radiation (λ= 1.54056 A^o) at generator voltage and current of 40 kV and 40 mV, respectively. Fourier Transform infrared (FTIR) spectrum was recorded on IR affinity, Shimadzu, Japan equipped with Shimadzu DRS-8000 DRIFT accessory and IR solution software with a spectral resolution of 4 cm^{-1}. Raman spectra were recorded with a SPEX Triplemate instrument at wavelength 488nm. The dispersion was carried out with ultrasonic bath Sapfir (150 W, 35 kHz). The colloid dispersion was centrifuged with Eppendorf Centrifuge 5430 equipped with F-35-6-30 rotor. The morphology and the elemental analysis of the synthesized MoS_2 sheets were analysed by FESEM using ZEISS Gemini scanning electron microscope (Germany) operated at an accelerating voltage of 9-7 kV. The TEM and HRTEM analysis were carried out using JEOL JEM-2100 Plus, Japan operated at an accelerating voltage 200 kV. The chemical composition of the synthesized MoS_2 sheets was analysed by X-ray photoelectron spectroscopy (XPS) measurements using a Thermo-Scientific ESCALAB Xi^+ spectrometer with a monochromatic Al Kα X-ray source (1486.6 eV) and a spherical energy analyzer that operates in the CAE (constant analyzer energy) mode using the electromagnetic lens mode. The CAE for survey spectra is 100 eV and that for high-resolution spectra is 50 eV. The catalytic oxidation of TMB and colorimetric detection of Cr(VI) ions were examined using a UV–vis spectrophotometer (MS-11-UV-1800, Shimadzu, Japan). The fluorescence spectra were recorded using Fluorescence Spectrophotometer (Horiba Fluorolog®-3).

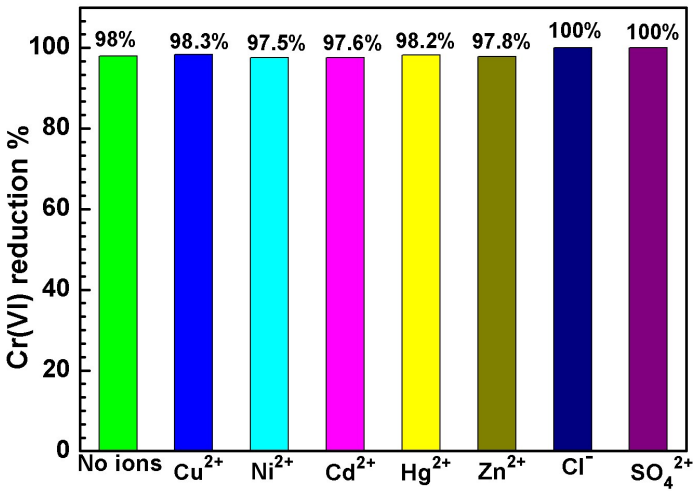

Fig. S1. Photocatalytic reduction of Cr(VI) in presence of different inorganic ions