Electronic Supplementary Information

Kelvin probe imaging of photo-injected electrons in metal oxide nanosheet from metal sulfide quantum dots under remote photochromic coloration†

A. Kondo,[a] G. Yin,[a] . N. Srinivasan,[a] D. Atarashi,[a] E. Sakai,[a] and M. Miyauchi*[ab]

[a] *Department of Metallurgy and Ceramics Science, Graduate School of Science and Engineering, Tokyo Institute of Technology, 2-12-1 Ookayama, Meguro-ku, Tokyo 152-8552, Japan. E-mail: mmiyauchi@ceram.titech.ac.jp*

[b] *Japan Science and Technology Agency (JST), 4-1-8 Honcho Kawaguchi, Saitama 332-0012, Japan.*

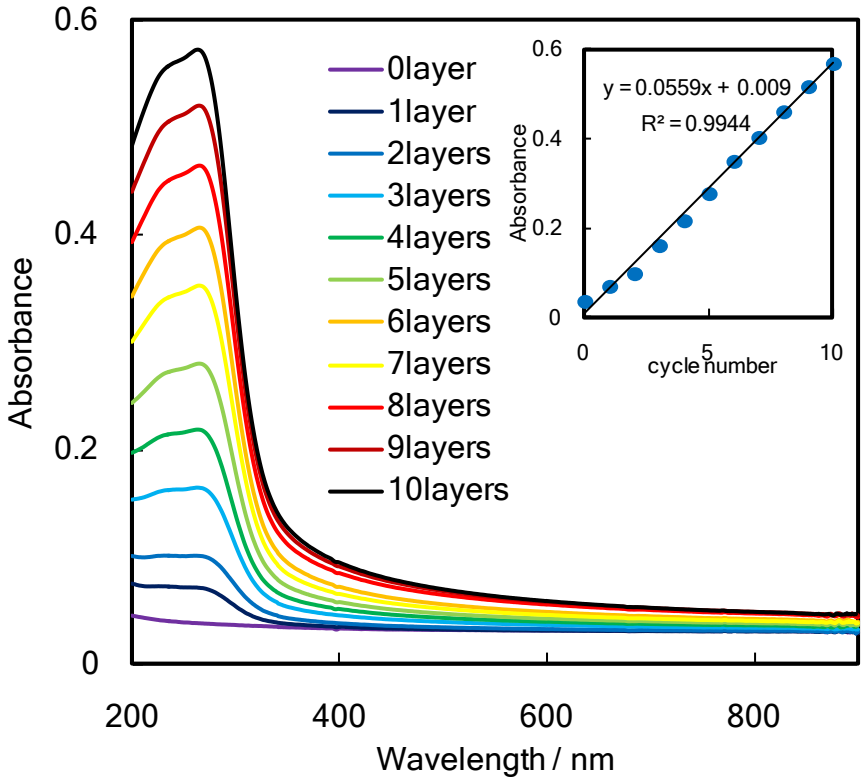

Fig. S1 UV-Vis spectra for layered thin films of $Cs_4W_{11}O_{36}^{2-}$ nanosheets by an alternate layered absorption method.

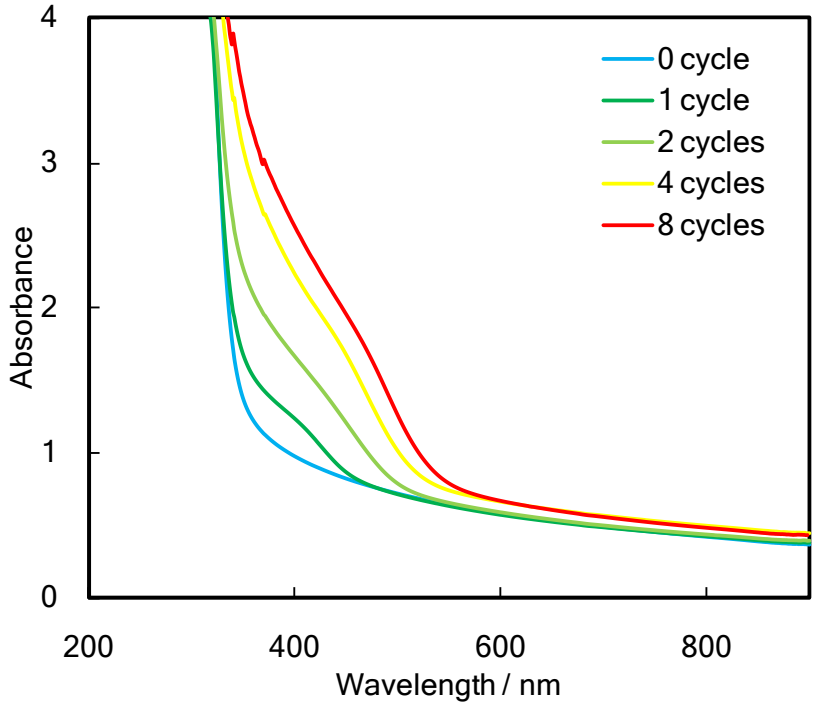

Fig. S2 Optical absorbance spectra for CdS/$Cs_4W_{11}O_{36}^{2-}$ thin films with different SILAR cycles for CdS grafting.

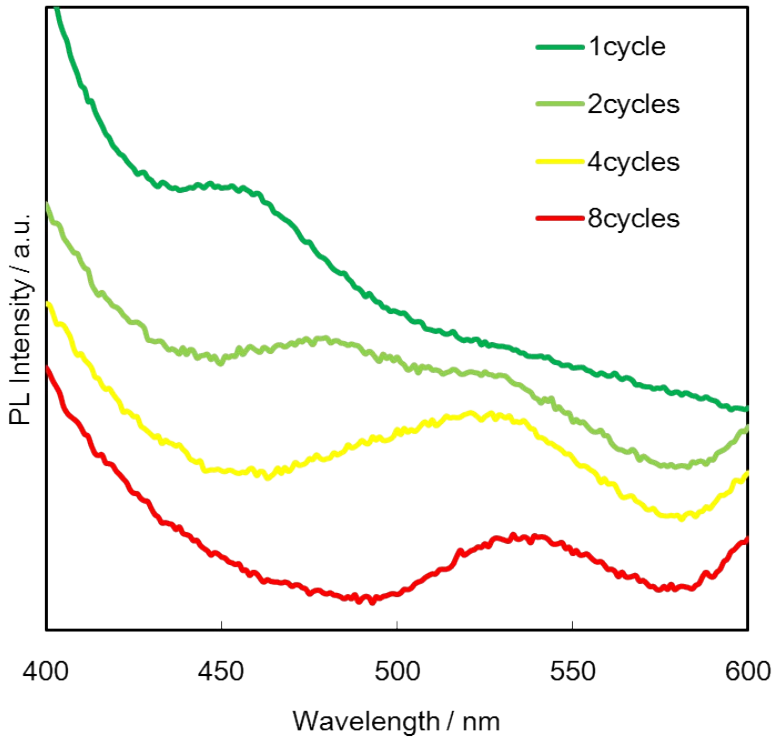

Fig. S3 Fluorescence spectra CdS/$Cs_4W_{11}O_{36}^{2-}$ thin films with different SILAR cycles for CdS grafting.

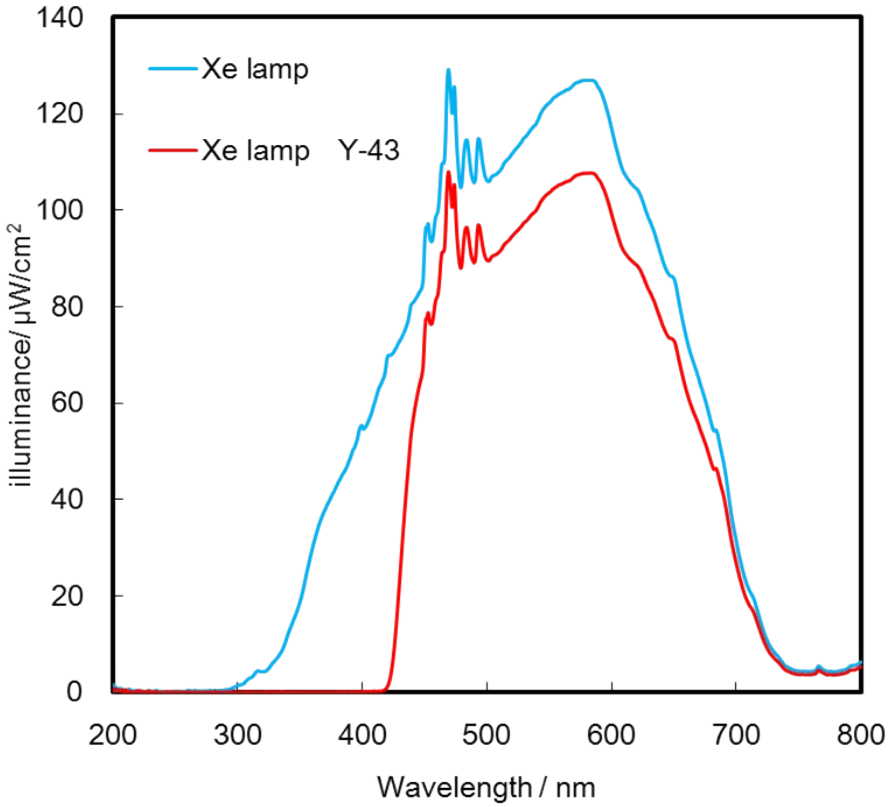

Fig. S4 Spectrum of light source (Xe lamp and that with UV-cutoff filter below 430 nm (Y-43 filter)).

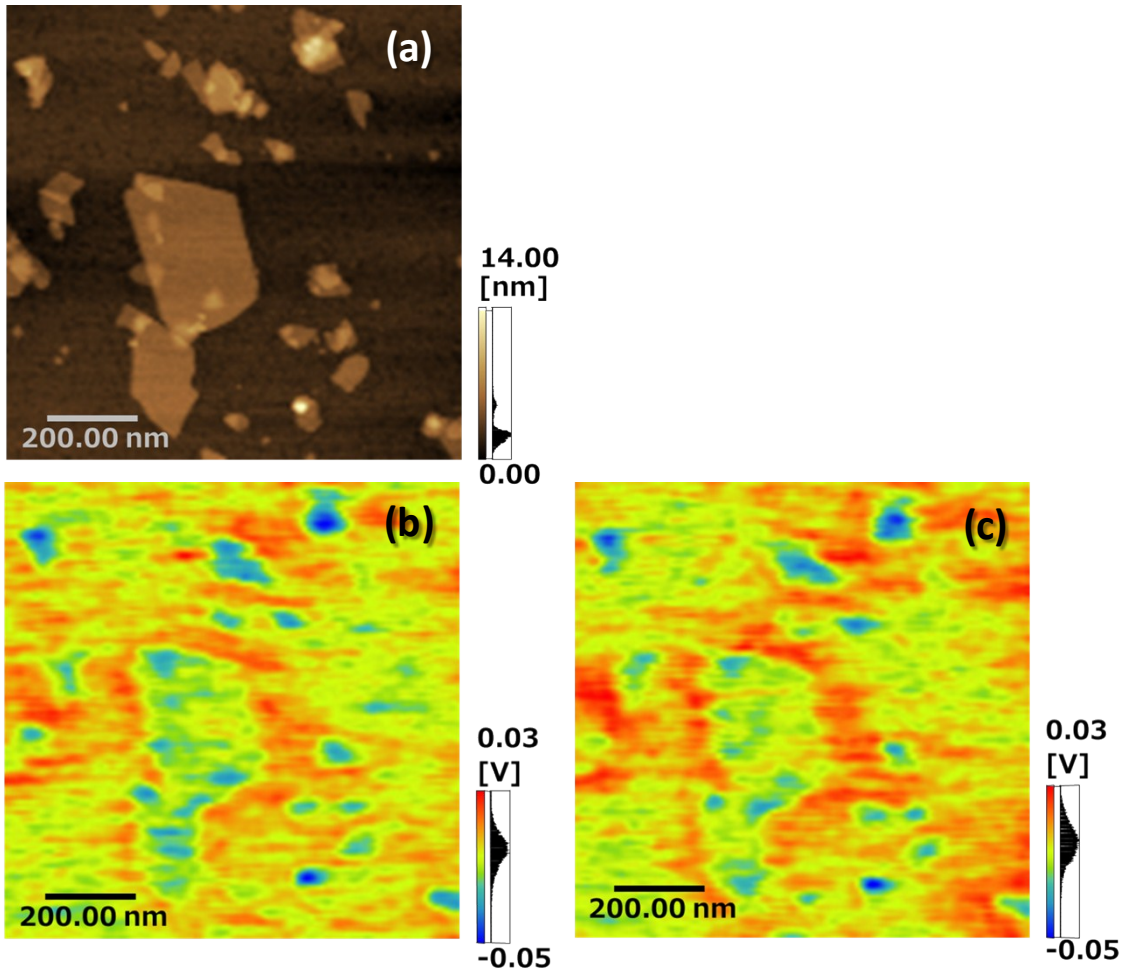

Fig. S5 AFM and KPFM images for the bare $Cs_4W_{11}O_{36}^{2-}$ film without CdS QDs grafting. (a) AFM image, (b) KPFM image before visible light irradiation, (c) KPFM image after visible light irradiation for 5 mins.

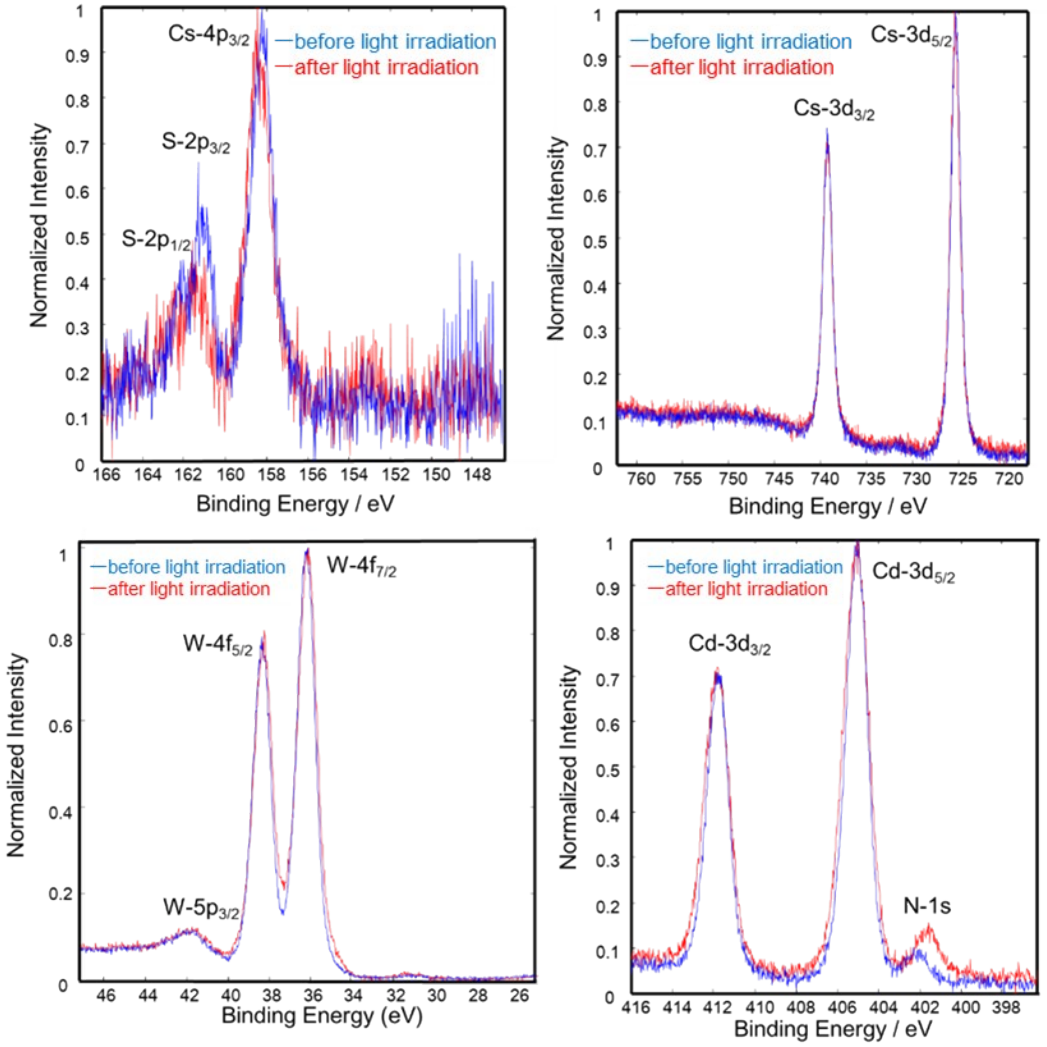

Fig. S6 XPS spectra before and after visible light irradiation for Cs-4p and S-2p, Cs-3d, W-4f, Cd-3d, respectively.

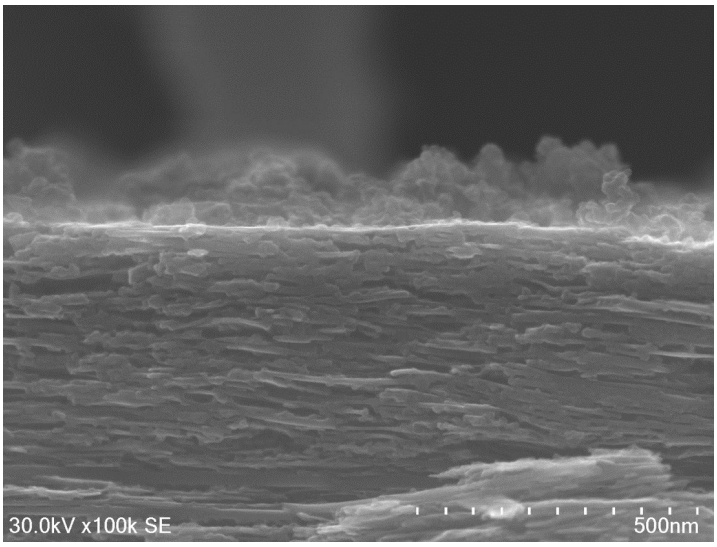

Fig. S7 Cross sectional SEM images for CdS/ $Cs_4W_{11}O_{36}^{2-}$ composite film.

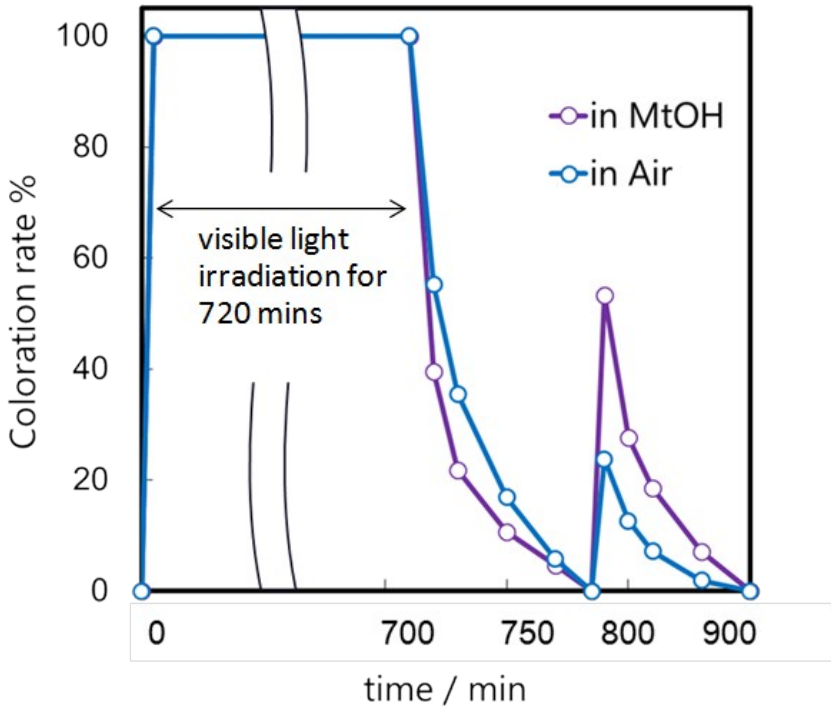

Fig. S8 Photochromic properties of the CdS/ $Cs_4W_{11}O_{36}^{2-}$ nanosheet film after long time exposure to visible light under ambient air or saturated gaseous methanol in nitrogen. Visible light was irradiated onto CdS/ $Cs_4W_{11}O_{36}^{2-}$ nanosheet film for 720 mins, then its changes in absorbance were recorded in dark condition in an ambient air. At the 780 mins, visible light irradiated again in air or methanol conditions, then its changes in absorption were recorded in dark condition in an ambient air again.