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Effects of Sn^{4+} dopant ions located either in the bulk or at crystallite surfaces on the ultraviolet photocatalytic activity of anatase

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Routine X-ray diffraction (XRD) measurements were performed on a powder sample ARL X'TRA Thermo Scientific diffractometer using Cu K_α radiation (wavelength λ = 1.5418 Å). All studied catalysts were found to be anatase type (space group $I4_1/amd$) single-phase polycrystalline materials. An XRD pattern of a hydrogen-annealed sample containing 0.6 at% Sn^{4+} on surface sites is shown in Figure S1. Its specific surface area S_{BET} determined by the BET method was found to be nearly 56 m^2g^{-1} and virtually not affected by the presence of the dopant used. Both ^{119}Sn and ^{121}Sb Mössbauer spectra were recorded on a MS-1104 spectrometer and analyzed by a least-square fitting program. To perform ^{119} Sn Mössbauer measurements a $Ca^{119m}SnO_3$ (E_γ = 23.88 keV) source along with a thin NaI(Tl) scintillator was used. To perform ^{121}Sb Mössbauer measurements a $Ca^{121*}SnO_3$ source (E_γ = 37.15 keV), producing in the same NaI(Tl) scintillator the 8.5 keV escape peak was used. During the measurements both $Ca^{121*}SnO_3$ source and studied powder sample (absorber) were introduced into the hole of a copper bar immersed in a Dewar flask filled with liquid nitrogen. Under these conditions, the temperature of both the source and absorber was close to 100 K. To perform *in situ* ^{119}Sn Mössbauer measurements with hydrogen-annealed powders a cylindrical quartz reactor equipped with a lateral thin-window sample cell was used. During the measurements both the sample cell filled with studied powder and the source were again introduced in the copper bar immersed in liquid nitrogen.

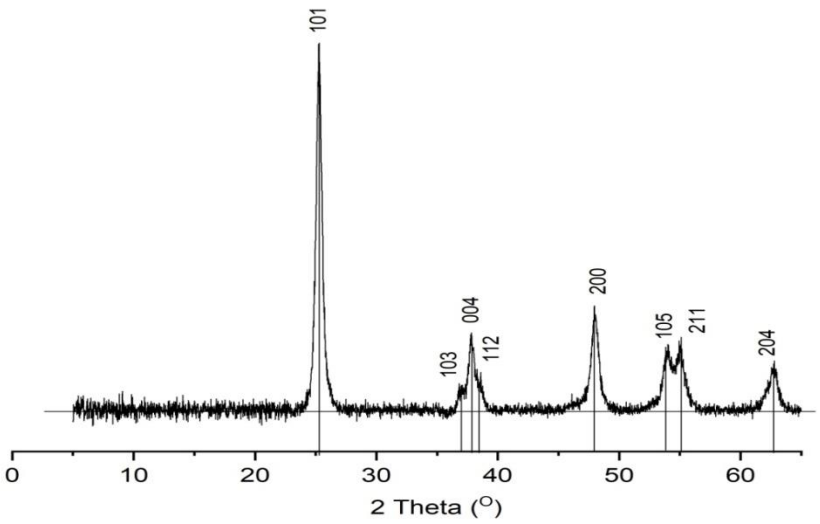

Figure S1 XRD pattern of hydrogen-annealed 0.6 Sn at% anatase TiO_2.