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# Effect of charge balance vacancies on the ultraviolet photocatalytic activity of $Fe^{3+}$-doped 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 $K_\alpha$ radiation (wavelength $\lambda = 1.5418$ Å). All studied catalysts were found to be anatase type (space group $I4_1/amd$) single-phase polycrystalline materials. An XRD pattern of one of the studied catalysts is shown in Figure S1. Their specific surface area $S_{BET}$ determined by the BET method was found to be 56 ÷ 58 $m^2\ g^{-1}$ and virtually not affected by the presence of the dopants used. Both $^{57}Fe$ and $^{121}Sb$ Mössbauer spectra were recorded on a MS-1104 spectrometer and analyzed by a least-square fitting program. To perform resonant absorption measurements involving by far less popular the Mössbauer isotope $^{121}Sb$, the 8.5 keV escape peak, produced by Mössbauer gamma rays ($E_\gamma$ = 37.15 keV) in a thin NaI(Tl) scintillator, was used. During the measurements both $Ca^{121m}SnO_3$ 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 absorber was close to 100 K and thus allowed us to consider the spectral contributions of the eventually present chemically different species of antimony as an acceptable estimate of their abundances.

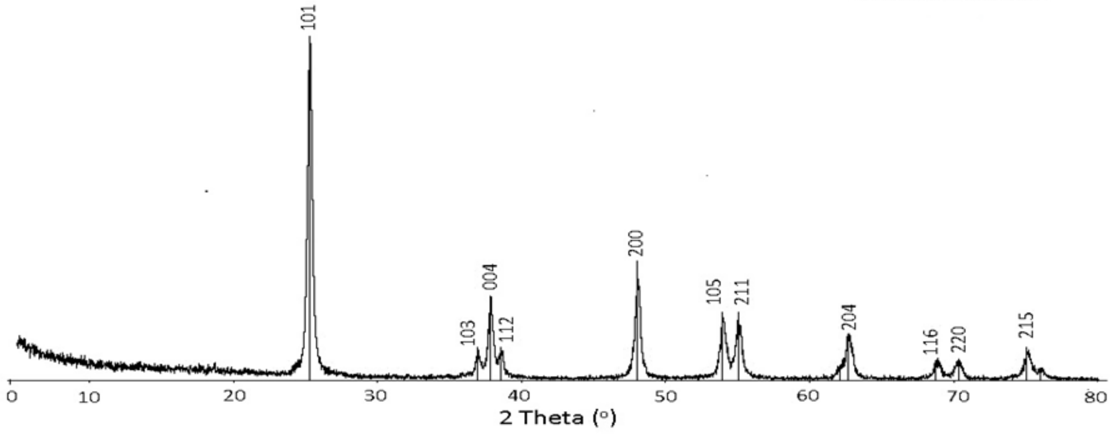

**Figure S1** XRD pattern of the co-doped sample (2 at.% $Fe^{3+}$+0.6 at% $Sb^{5+}$):$TiO_2$.