

Abstract

Compared to single-phase, the anatase-rutile TiO_2 phase has piqued researchers' interest. Incorporating a dopant into the microstructures of TiO_2 improves its properties. In contrast to the annealing method, incorporating Sn^{4+} into the lattice of TiO_2 allows the transformation from anatase to rutile at low temperature. The findings showed that ions containing the sulfate Sn^{4+} substituted that of Ti^{4+} in the TiO_2 lattice and dispersed in the matrix. The substitution caused the lattice structure to deform at low temperatures, causing the transformation of the phases. The increase in the mol% of Sn in TiO_2 lattice favored the rutile phase content. The narrowing of the bandgap caused by Sn doping significantly increases photocatalytic operation in the visible light. Consequently, near-contact phase junctions in between the anatase and rutile phase have been established, taking into consideration the charge separations. The sample at 5.5 mol% of Sn exhibited the highest photoactivity.