# The pH dependent Relationship of Catalytic Performance of Fe doped $SnO_2$ Nanoparticles

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Fe-doped $SnO_2$ nanoparticles (Fe-$SnO_2$) were synthesized by varying Ph dependence. The doped particles were then analyzed by using various surface analysis techniques such as transmission electron microscopy (TEM), scanning transmission X-ray microscopy (STXM), and high-resolution photoemission spectroscopy (HRPES). We evaluated the catalytic effects of these doped particles on the oxidation of 4-ATP in aqueous solution by taking electrochemistry (EC) measurements and on the photocatalytic oxidation of 4-ATP by using HRPES under UV illumination. Through the spectral analysis, we found that The Fe- $SnO_2$ NPs fabricating under acid condition (pH=1.5) exhibit enhanced catalytic activities, which according to the various surface analyses were due to the enhanced defect structure.