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(G*) POS-F44 – Electronic properties of pure and iron(III) doped TiO2 nanomaterials

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In the past few decades, scientists discovered that TiO2 was capable of purifying polluted water without any addition of strong oxidants. Active hydroxyl radicals can be produced through photodegradation process when TiO2 is illuminated under water, and such process is viewed as a favorable method for on-site decomposition of organic compounds. However, the main drawback of this process suffers from the range of wavelength TiO2 can absorb, which lies in Ultraviolet region. In previous studies, Fe (III) doping was used to broaden the band gap of titania and allow the material of absorb into the visible region. Yet, in our own work, the doping of TiO2 with iron does not provide the expected improvement during methylene blue photodegradation under simulated sun light illumination.

In this study, we characterized pure and Fe(III) doped TiO2 nanopowders using SEM, EDS, XRD, valence band XPS and UPS, to learn about the phase, particle size, chemical composition, and more importantly the influence of Fe (III) dopants on the valence band structure of TiO2 nanoparticles synthesized through Sol-Gel method. The relationship between the valence band structure and the material's photocatalytic properties will be discussed.

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