

# **New Insights into the Mechanism of TiO<sub>2</sub> Photocatalysis: Thermal Processes beyond the Electron-Hole Creation**

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## **Abstract**

Infrared spectroscopic studies of a UVA irradiated layer of TiO<sub>2</sub> nanoparticles in contact with an aqueous solution free of any photocatalytic degradable compound showed that a volume of water is incorporated in the layer. Such a phenomenon is attributed to a mechanism of deaggregation of particles agglomerates resulting from the capacity of the system to use the energy released by recombination of photogenerated electrons and holes. In this mechanism, bonds responsible for maintaining nanoparticles agglomerated are broken allowing the particles to separate. Water molecules fill the space in between the particles, and it is experimentally evinced by the increase of the band corresponding to the bending mode of water. Under UVA illumination, the TiO<sub>2</sub> exposed area thus increase, hence promoting an enhancement of the adsorption capacity of the photocatalyst.