

## Effect of Ti+ Irradiation on the Photoluminescence of TiO<sub>2</sub> Nanofibers

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**Abstract :** TiO<sub>2</sub> nanostructures have attracted much attention due to their optical, dielectric and photocatalytic properties as well as applications including optical coating, photocatalysis and photoelectrochemical solar cells. This work aims to prepare TiO<sub>2</sub> nanofibers (NFs) on titanium substrate (Ti) by in situ oxidation of Ti foils in a mixture solution of concentrated H<sub>2</sub>O<sub>2</sub> and NaOH followed by proton exchange and calcinations. Scanning Electron microscopy (SEM) revealed an obvious network of TiO<sub>2</sub> nanofibers. The photoluminescence (PL) spectra of these nanostructures revealed a broad intense band in the visible light range with a reduced near edge band emission. The PL bands in the visible region, mainly, results from surface oxygen vacancies and others defects. After irradiation with Ti<sup>+</sup> ions (the irradiation energy was E = 140 keV with doses of 1013 ions/cm<sup>2</sup>), the intensity of the PL spectrum decreased as a consequence of the radiation treatment. The irradiation with Ti<sup>+</sup> leads to a reduction of defects and generation of non irradiative defects near to the level of the conduction band as evidenced by the PL results. On the other hand, reducing the surface defects on TiO<sub>2</sub> nanostructures may improve photocatalytic and optoelectronic properties of this nanostructure.

**Keywords :** TiO<sub>2</sub>, nanofibers, photoluminescence, irradiation

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