

## Luminescence and Structural Features of ALD TiO<sub>2</sub> Coated Porous Silicon Surface

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In the present work, we investigated luminescence and structural features of Atomic layer deposition (ALD) TiO<sub>2</sub> coated porous silicon (Si) surface fabricated by metal-assisted chemical etching. We assume that combination of these two materials promises the great benefits in advanced technologies and it requires further investigations.

TiO<sub>2</sub> thin (3-20 nm) films were grown on p type Si (100) nanostructures by ALD using TiCl<sub>4</sub> and water as precursors. The crystalline structure, chemical composition, and morphology of the deposited films and initial PSi were investigated by scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), micro-Raman spectroscopy, X-ray diffraction, and atomic force microscopy. It was found that layer of TiO<sub>2</sub> on the nanostructured silicon surface has granular structure and the approximate size of titanium dioxide nanocrystallites are laying in the range 7-15 nm (Fig.1). The photoluminescence (PL) spectra were measured at room temperature. Some interesting features were found on the PL spectra. We observed the evolution of PL due to annealing of obtained structure that caused by the transition of the amorphous phase to the crystalline one (Fig.2).

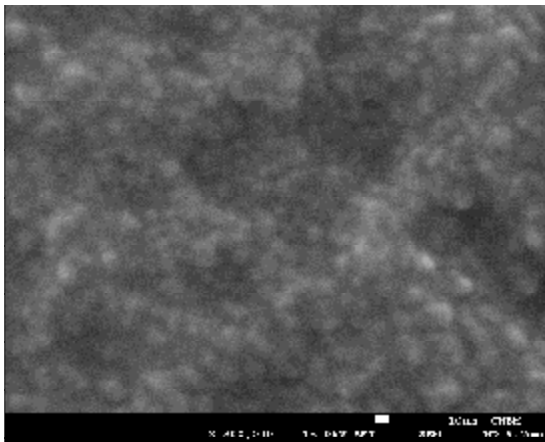


Fig.1. Plane view SEM image of TiO<sub>2</sub>-PSi surface.

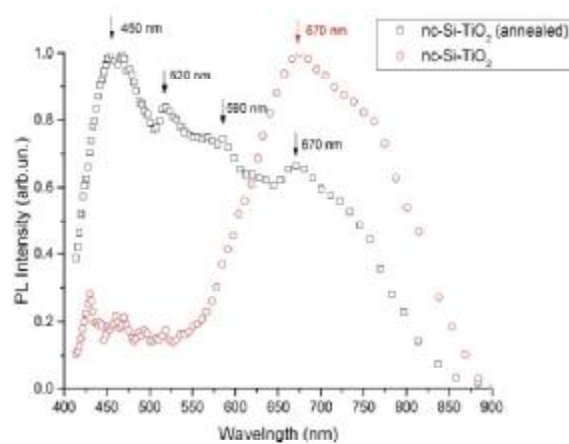


Fig.2. PL spectrum of TiO<sub>2</sub>-PSi before and after annealin for an hour at 400°C in the air.