ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ
ΤΜΗΜΑ ΕΠΙΣΤΗΜΗΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ ΥΛΙΚΩΝ

ΠΑΡΟΥΣΙΑΣΗ ΜΕΤΑΠΤΥΧΙΑΚΗΣ ΔΙΠΛΩΜΑΤΙΚΗΣ ΕΡΓΑΣΙΑΣ

Τίτλος

«Τρισδιάστατη Λιθογραφία Λέιζερ με Εφαρμογές στην Φωτοκατάλυση»
«3D Laser Lithography with Applications in Photocatalysis»

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Επιβλέπων: Στυλιανός Τζωρτζάκης

Πέμπτη 24/02/2022

10:00

Η παρουσίαση θα πραγματοποιηθεί στην **αίθουσα Β2 του Τμήματος Χημείας,** του Πανεπιστημίου Κρήτης.

ABSTRACT

In this work three-dimensional (3D) structures covered by titanium dioxide (TiO_2) nanorods were designed and developed. These devices were designed for photocatalytic applications due to the properties of this material and the increase of the active surface through the 3D structuring. Although in the past, 3D scaffolds covered by zinc oxide (ZnO) nanorods had been realized, the photocatalytic performance of the new TiO_2 hybrid 3D devices has shown promising results. As a consequence, the implementation of the same idea but with different and more efficient photocatalytic material further enhances the photocatalytic performance.

Five important steps were realized for the accomplishment of this work. First, hybrid 3D structures were fabricated via the MultiPhoton Lithography (MPL) method. Then, the hybrid structures underwent a Post-Thermal Treatment (PTT) in order to be transformed into 3D structures consisting of a ceramic-like material. The next step was the deposition of a seed layer of TiO_2 on the 3D structures by the Pulsed Laser Deposition (PLD) method.

Next, the hydrothermal synthesis of TiO_2 nanorods was achieved using an Aqueous Chemical Growth (ACG) technique. Finally, the photocatalytic performance of new 3D devices was characterized via photocatalytic degradation of organic pollutants such as methylene blue (MB) and stearic acid. The photocatalytic performance of the 3D structures covered by TiO_2 nanorods was compared against the performance of TiO_2 nanorods grown on 2D surfaces. Also, the hybrid material performance was compared against photocatalytic films. The expected increase of photocatalytic efficiency of the new 3D devices has been confirmed, showing a dramatic decrease of organic pollutants concentration with a decomposition coefficient of $k=0.059min^{-1}$.