ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ
ΤΜΗΜΑ ΕΠΙΣΤΗΜΗΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ ΥΛΙΚΩΝ

ΠΑΡΟΥΣΙΑΣΗ ΜΕΤΑΠΤΥΧΙΑΚΗΣ ΔΙΠΛΩΜΑΤΙΚΗΣ ΕΡΓΑΣΙΑΣ

Τίτλος

«Nanostructured Doped Nickel Oxide Thin Films Made by RF Sputtering as Hole Transfer Layers for Transparent Optoelectronic Devices»

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Επιβλέπων καθηγητής: Νικόλαος Πελεκάνος

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09:00

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

ABSTRACT

The increasing energy consumption and consequently, the increase in air pollutants have led to phenomena such as global warming (greenhouse effect) with the well-known effects on the environment and human health. Buildings are responsible for consuming about 40% of the total produced energy, while windows are responsible for the loss of 10-25% of the thermal energy of buildings. A properly designed smart window can control and modulate solar heat and lighting and it is possible, at the same time, to produce and store solar energy. In the last years, there has been increasing interest in metal oxides due to their outstanding properties. The emerging class of wide gap oxide semiconductors can be fabricated as transparent solar cells, harvesting UV solar radiation, and integrated into optoelectronics as power producers. Thus, transparent solar cells can be used for energy-autonomous smart windows like electrochromics and/or tandem solar cells.

In this work, undoped NiO and Nitrogen (N) or Niobium (Nb) single or co-doped NiO thin nanostructured films were fabricated by rf sputtering by employing Ni and Ni-Nb targets

in plasma containing % (Ar-O_2-N_2) gases. All films were p-type oxide semiconductors but only N-doped NiO films were transparent. The oxide layers were characterized by AFM, XRD, SEM-EDX, XPS, Hall-effect and UV-Vis-NIR spectroscopy and the optimum ones were used to demonstrate all oxide UV photovoltaics. Heterostructures based on metal oxides were fabricated, namely p-NiO/n-TiO_2 and the properties of the heterodiodes were investigated in the dark and as UV-sensitive solar cells. The layers of TiO_2 consisted of double mesoporous/compact TiO_2 films, as the ones used in high efficiency perovskite solar cells.