ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ
ΤΜΗΜΑ ΕΠΙΣΤΗΜΗΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ ΥΛΙΚΩΝ

ΠΑΡΟΥΣΙΑΣΗ ΜΕΤΑΠΤΥΧΙΑΚΟΥ ΔΙΠΛΩΜΑΤΟΣ ΕΙΔΙΚΕΥΣΗΣ

Τίτλος

«Nanowire core-shell heterostructures for photovoltaic applications»,

«Νανονηματικές ετεροδομές πυρήνα-φλοιού για φωτοβολταϊκές εφαρμογές»

Μανιδάκης Εμμανουήλ

Μεταπτυχιακός Φοιτητής

Τμήματος Επιστήμης και Τεχνολογίας Υλικών, Πανεπιστημίου Κρήτης

Επιβλέπων καθηγητής κ. Ν. Πελεκάνος

Παρασκευή, 05/10/2018,

14:00 μ.μ.,

Αίθουσα Α210,
Κτίριο Τμήματος Μαθηματικών και Εφαρμοσμένων Μαθηματικών,

Πανεπιστήμιο Κρήτης

Abstract

Nanowire arrays are intensively studied in view of third generation solar cells applications. Specifically, III-V nanowires are attractive due to their excellent optoelectronic properties, such as high mobility of the carriers and light emission. These nanowires however suffer from surface-related parasitic effects. Core-shell nanowire heterostructures reduce these effects and provide in addition many advantages such as band-gap engineering, antireflective properties and piezoelectric effects due to lattice mismatch of the materials. The critical parameters for an efficient solar cell

based on nanowires are the nanowire diameter, height, distance between nanowires and the array's symmetry. In this thesis, we study GaAs-InGaAs core-shell nanowire heterostructures for photovoltaic applications. The nanowire samples were grown on Si (111) by Ga-assisted molecular beam epitaxy via the vapor-liquid-solid mechanism. Scanning electron microscopy images were taken in order to study the diameter, height, density and the parasitic 2D layer in between nanowires on the interface with the substrate. The optical characterization of the samples was accomplished with photoluminescence measurements versus temperature. Subsequently, solar cell devices based on the nanowire samples were fabricated. After fabrication, SEM images were taken again in order to measure the density of the protruding nanowires, as only these are important for the carrier collection. The final characterization of the nanowire solar cells was achieved by I-V and spectral quantum efficiency measurements.