Ηράκλειο 21/02/2022

Η ΠΑΡΟΥΣΙΑΣΗ ΔΙΠΛΩΜΑΤΙΚΗΣ ΕΡΓΑΣΙΑΣ

της φοιτήτριας **Δέσποινας Μανιδάκη,** θα γίνει τη

<u>Πέμπτη 24/02/2022</u> και ώρα **15:00**

στην αίθουσα Β2 του Κτηρίου Χημείας

Θέμα Διπλωματικής:

«2D Hybrid Germanium Iodide Perovskite Semiconductors »

Επιβλέποντες: κ.κ. Κωνσταντίνος Στούμπος και Γεώργιος Κοπιδάκης

Για την παρακολούθηση της παρουσίασης δια ζώσης, το κοινό θα πρέπει να έχει τα απαραίτητα δικαιολογητικά (πιστοποιητικό εμβολιασμού, νόσησης ή rapid test).

Περίληψη:

In the past decade, the class of halide perovskite compounds of the chemical formula AMX_3 ($A = Cs^+$, $CH_3NH_3^+$, or $HC(NH_2)^{2+}$, $M = Ge^{2+}$, Sn^{2+}, Pb^{2+}, X = Cl, Br, I) have been investigated extensively, owing to their remarkable achievements as semiconductors in optoelectronic devices, primarily in photovoltaics. Since 2012, when the $CH_3NH_3PbI_3$ perovskite was used as a light absorber in all solid-state photovoltaics, perovskite photovoltaics have leaped forward to an impressive 25.7% efficiency. Despite this major success, there are still significant drawbacks that need to be addressed when employing lead-containing perovskites, such as the devices' long-term instability and the toxicity of lead in the environment.

Under this pretext, in this diploma thesis, the synthesis of a new class of halide perovskites was investigated in the form of the 2D perovskite homologous series with a general chemical formula $(CH_3(CH_2)_3NH_3)_2(CH_3NH_3)_{n-1}Ge_nI_{3n+1}$ (where n is an integer). The choice of this system was made on the grounds that i) the low dimensions offer greater stability due to the large fraction of nonpolar molecules that can repel water, and ii) that germanium has negligible toxicity. In addition, the presence of Ge gives a new

feature in the perovskite structure by breaking inversion symmetry and thus producing polar perovskite crystal structures, making the compounds suitable for Non-Linear Optical (NLO) applications, particularly related to the second-harmonic generation (SHG). The as synthesized materials were characterized by single-crystal X-Ray diffraction to determine the crystal structure, whereas phase purity was checked using powder X-ray diffraction. The bulk materials were characterized by elemental analysis (using SEM/EDS), while the bandgap of the semiconducting materials was determined using optical diffuse reflectance measurements.