סמינר מחלקתי – הנדסת חומרים

הנך מוזמן בזאת לסמינרים אשר יתקיימו ביום ה', 10 במאי 2018, כה' באייר תשע"ח
בשעה 14:00, בניין 51 חדר 15 (באודיטוריום)

Deposition of Boron Carbide Layers by PVD and PECVD Techniques: Comparison of the Effect of Bias Voltage

Eyal Grinberg
Supervised by Dr. Avi Raveh and Prof. Yuval Golan

Boron carbide is a ceramic covalent material known for its unique combination of high melting point, high hardness, and high wear and impact resistance. These properties make boron carbide material attractive for mechanical properties applications, such as cutting tools and abrasive materials.

The properties and the structure of boron carbide coatings depend mostly on the deposition techniques and on the process parameters. In the present study, we examined the effect of bias voltage on the properties of the fabricated coatings deposited by Physical Vapor Deposition (PVD) and Plasma Enhanced Chemical Vapor Deposition (PECVD) techniques. In the PVD technique we used the sputtering method with starting target material of B_4C (3" in dia. and 0.25" thick), while for PECVD, Ortho-Carborane powder ($B_{10}C_2H_{12}$) was used as the precursor material. The coatings were deposited on (111) silicon wafers using the two techniques under constant parameters as a function of bias voltage (≤300 V). Before the deposition process, the substrates were sputter-cleaned in argon plasma for 30 min. in order to remove the native oxide layer and to improve the substrate-coating adhesion. After deposition, physical properties such as homogeneity, layer thickness, weight gain and density were analyzed. In addition, the composition, structure and the mechanical properties (microhardness and residual stresses) were studied by various methods including XPS, SEM-EDS, XRD, Vickers test and Stoney method.

In this presentation, we will present, discuss and compare the properties of the fabricated coatings of boron carbide deposited by the PVD and PECVD techniques.

סמינר מחלקתי – הנדסת חומרים

High accuracy electrical measurements for material characterization

Yuri Kirshon

Supervisors: Prof. Guy Makov, Dr. Eyal Yahel
The Department of Materials Engineering,
Ben-Gurion University of the Negev, Be'er Sheva, Israel

The electrical resistivity of liquid metals and alloys is a probe of the electronic properties of the system. The present study focused on the development of an experimental apparatus to measure the electrical resistivity of liquid metals and its application to selected metal and alloy systems.

The presentation consists of two parts: the first reports on the design of the experimental measuring system, including choice of component materials, coding of controlling software, measurement calibration and error estimation. The second part reports on measurements of resistivity in several pure liquid metals – gallium, bismuth and antimony as a function of temperature. The metals were chosen due to their interesting physical properties as well as their relative low melting points. Finally, the resistivity of liquid binary metallic alloys of Bi-Ga as a function of composition and temperature was measured.

In all the studies the resistivity was determined up to an error of 3% and the results are with good agreement with previous studies. A clear linear correlation between resistivity and temperature is obtained for both pure metals and the tested alloys. For the binary alloys it can also be concluded that the resistivity cannot be calculated using the relative composition of its components and their resistivity.