הטכניון – מכון טכנולוגי לישראל **הפקולטה להנדסת מכונות**

סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ה' 18.06.15 (א' בתמוז, תשע"ה), בבניין דן-קאהן, קומה 0, באודיטוריום 1 בשעה 14:30.

יוצא: מני קבלה

מנחה: פרופ"ח דורון שילה

על הנושא:

Fabrication, Characterization, and Implementation of Actuators Based on Thin Shape Memory Alloy Films

להלן תקציר ההרצאה:

Shape Memory alloys (SMA) are a unique class of materials which exhibit strongly nonlinear thermo-mechanical behaviors associated with a martensitic phase transformation. SMA actuators have the highest work-output per unit volume amongst all other actuation methods. In order to integrate SMA thin films into MEMS devices, it is necessary to understand the effect of deposition conditions on their properties and to find a quantitative characterizing technique at small scales for routine measurements of the thermo-mechanical properties of thin SMA films, as a part of their development and production process.

We present an applied research on the thermo-mechanical properties of thin SMA films and actuators. The research includes a comprehensive study about the relationships between sputter deposition conditions, grain size, and phase transformation temperatures in NiTi thin films. Our results indicate the existence of a critical grain size of approximately 50-100 nm, below which a significant inhibition of the martensitic transformation occurs. Further, we study the effect of deposition conditions and show that a desired uniform martensitic film can be achieved by decreasing the impact energy of the deposited atoms. In addition, we present a new characterization method which use nano-dynamic modulus analysis for the characterization of transformation stress and strain in superelastic thin films. Finally, we implement the SMA thin film into a novel in-plane MEMS actuator which can provides work output larger by more than two orders of magnitude than all other actuation methods. This capability allows the actuator to work against stiff springs which are essential for the device ability to sustain vibrations, impacts, and accelerations.

בברכה,

שרון אמיר שטן

מרכז הסמינרים