

סמינריון

הנדך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ב' 27.07.15 (יא' באב, תשע"ה), בבניין דן-קאהן, קומה 0, באודיטוריום 1 בשעה 14:30.

ירצה : יוסי פרוז

מנחה : פרופ"מ דן מרדכי

על הנושא:

Towards a Universal Size-Dependent Strength of FCC Nanoparticles

להלן תקציר ההרצאה:

Understanding dislocation nucleation is essential to control plasticity of defect-free specimen. Free surfaces in metallic materials become increasingly important as the dimensions are minimized into the sub-micrometer scale. In result, there is an inverse relation between their strength and the characteristic microstructural length scale. In this talk, we present an atomistic study of the strength of various FCC defect-free nanoparticles. Simulations of compression are performed on Wulff shaped nanoparticles along the [111] crystallographic direction. We show here that all nanoparticles yield by nucleating Shockley partial dislocations at the vertices. The compressive stress at which the partial dislocation nucleates is smaller for larger particles for all materials. The dependence of the strength on the size obeys a power-law, with a universal exponent for all FCC nanoparticles. The exponent corresponds to the exponent of the power-law decay of the stresses from the vertices. The prefactor of the power-law depends on material properties. With the help of dimensional analysis and classical nucleation theory of dislocations we propose that the exponent corresponds to the geometry, which is similar to all FCC metals, and the prefactor is linearly increasing with a dimensionless parameter, which holds within the material properties. Based on these results, we discuss a universal law for the strength of FCC nanoparticles and its fundamental differences from the universal law found experimentally for FCC pillars.

בברכה,

פרופ' נא אמיץ אט

מרכז הסמינרים