# SEMINAR - סמינר

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ד' 18.09.2019 (י"ח באלול תשע"ט), בניין דן קאהן, חדר 217, 13:30.

**מרצה:**


## Prof. Javier LLorca

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**על הנושא:**

# High-throughput experimental techniques to measure the CRSS for slip and twinning in Mg and Mg alloys

The seminar will be given in English

**להלן תקציר ההרצאה:**


Mg and its alloys stand for the lightest structural metals and present high specific-strength, excellent bio-compatibility and reduced cost. One main limitation for the engineering application is the reduced ductility and formability at room temperature whose origin can be traced to the hcp lattice structure. Dislocation slip in hcp Mg crystals mainly occurs by basal and prismatic slip along <a> directions as well as by <c+a> dislocations on the pyramidal planes. However, as the Critical Resolved Shear Stress (CRSS) for pyramidal slip is very large, deformation along the <c> axis has to be accommodated by twinning, a polar mechanism which only takes place when the c axis of the hcp lattice is extended. Thus, the large differences in the CRSS values to activate plastic slip in the different systems in Mg as well as the polarity of twinning lead to the large plastic anisotropy of Mg alloys, that has very negative effects on the ductility.

Alloying with different elements is a natural strategy to improve the strength of different slip systems and modify the plastic anisotropy. However, the accurate determination of the effect of solute atoms and precipitates in the CRSS for each slip is very expensive because it requires the manufacturing of single crystals with different composition. This problem may be overcome by the combination of micropillar compression tests and high-throughput processing techniques based on the diffusion couples [1]. This methodology requires a detailed analysis the effect of micropillar dimensions on the flow strength and can be easily extended to high temperature. Using this methodology, the effect of Al and Zn in solid solution on the CRSS for basal and pyramidal slip and twinning as well as of MgZn2 precipitates on basal slip was determined. The results were compared with predictions from first-principles and/or continuum models and showed the effect of alloying on the strength and plastic anisotropy.



[1]J.-Y. Wang, N. Li, R. Alizadeh, M. A. Monclús, Y. W. Cui, J. M. Molina-Aldareguía, J. LLorca. Acta Materialia, 170, 155-165, 2019.


**מארח:** פרופ"מ שמוליק אוסובסקי

בברכה,

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