



School of Nano Science



IPM Condensed Matter &
Statistical Physics Group

Weekly Seminar

Metal-based Nanocomposites: Plasticity and Tribological Behavior Analyzed by Atomistic Simulations

Invited speaker:

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Abstract:

In the last two decades, emergence and development of different nano-scaled synthesis and characterization methods for metal matrix nanocomposites (MMNCs) have made them the center of academic and industrial communities' focus owing to their excellent physical and mechanical properties. Accordingly, deformation mechanism of these nanocomposites should be deeply addressed in the presence of nanofillers of different sizes and distribution. Although failure of NCs is a macroscopic phenomenon, this is resulted by the atomic-scale structural variations of the sample. Therefore, for closer study of the failure mechanism of these NCs considering the structural changes during their deformation, different atomistic-based approaches can be utilized. Among them, molecular dynamics simulation is the most applicable one as discussed in this talk. In the first part of this presentation, employing the results of several case studies, the influence of surface and volumetric porosities on the plastic deformation of MMNCs is examined. The underlying mechanism governing this behavior is also discussed through microstructural characterization provided by the means of dislocation extraction analysis. This is followed by inspection of the temperature role on the plastic deformation of these NCs. At the second part, I will utilize MD simulation of the nanoscratching process to explore the dominant factors influencing the nanotribological characteristics of metal matrices in the presence of graphene sheets and silicon carbide nanofillers

Wednesday, 2 Bahman 1398 (January 22, 2020), 14:00-15:00

Seminar Room (Classroom A), Farmanieh Building, IPM