



**UNIVERSITY OF CALIFORNIA, IRVINE**

*Department of Materials Science and Engineering*

## *Mechanical Behavior of Heterogeneous Metallic Glasses*



**Assistant Professor Paulo Branicio**

*Department of Chemical Engineering and Materials Science  
University of Southern California*

**Thursday, May 19, 2022, 2:00-3:20 p.m.**

**Location: McDonnell Douglas Engineering Auditorium (MDEA)  
De**

**Abstract:** Heterogeneous metallic glasses (MG), i.e., metallic glasses with a heterogeneous amorphous structure, can considerably increase the ductility of traditional MG while preserving their outstanding strength and elastic limit. In this talk, I will discuss three promising heterogeneous MG designs: gradient nanoglasses (GNG), brick and mortar MG composites, and bicontinuous nanoporous MG. Recent simulation results on these designs suggest they effectively delocalize plastic deformation in the samples under mechanical loading by synergizing deformation of the heterogeneous material features leading to a superior compromise of strength and ductility. The modeling results are in excellent agreement with available experimental data and highlight the significant enhancement of ductility induced with the use of heterogeneous metallic glass architectures and point out exciting novel applications of these materials.

**Bio:** Paulo Branicio is currently an Assistant Professor at the University of Southern California ([www.usc.edu](http://www.usc.edu)), where he runs the Branicio Research Lab ([branicio.usc.edu](http://branicio.usc.edu)). He obtained his Ph.D. in Physics from the Federal University of São Carlos (UFSCar), São Carlos, Brazil. He was a Postdoc at the Louisiana State University (LSU) and the University of Southern California (USC), USA. During 2008-2016 he was an IHPC Independent Investigator, Scientist, and Senior Scientist at the Institute of High Performance Computing (IHPC) – A\*STAR, Singapore. In 2017, he joined USC as an Assistant Professor of Chemical Engineering and Materials Science. Paulo has co-authored over 85 peer-reviewed publications. His research interests include molecular dynamics simulations of metallic glasses, metals and ceramics under extreme conditions, nanostructured materials, phase change materials for data storage, and scalable parallel algorithms for data mining and structure analysis. He is a member of the editorial board of Scientific Reports.