



Early Career Distinguished Scholar (ECDS) Award Seminar

Tuesday, June 6, 2023 at 10 AM
Location: ISEB 1010

"Designing Advanced Materials for Extreme Dynamic Environments: A High Throughput Framework"

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Abstract: The complexity of today's metallic alloys and ceramics is increasing rapidly to meet the growing demands for high-performance materials in extreme dynamic environments. These materials are essential for a wide range of applications, including aircraft components, automobile frames, vehicle and body armor protection parts, satellite systems, and multifunctional hypersonic structures. However, traditional methods used to evaluate the dynamic behavior of materials, such as the Kolsky bar or large spall experiments, are often low throughput, expensive, and do not provide high-fidelity microstructure-property linkages critical for designing materials for extreme environments. In my talk, I will discuss the application of novel, high-throughput testing protocols for studying the mechanical response of metallic alloys with carefully designed microstructures. These protocols combine two dynamic testing methods, a custom nanoindentation protocol, and a laser-driven micro-flyer impact protocol, facilitating rapid testing of materials across several orders of strain rates and shock levels. This approach has been used to develop lightweight Magnesium alloys for protection applications. Additionally, I will present results related to a third high-throughput dynamic protocol called Ox-LIPIT (Laser induced particle impact testing in high-pressure oxygen systems), which can be used to design burn-resistant materials for reusable rocket engines. Taken together, these novel high-throughput techniques combined with advanced processing/manufacturing methods hold the potential to revolutionize materials design for extreme environments.

Bio: Dr. Suhas Eswarappa Prameela is currently the MIT Engineering Excellence Post-doctoral Fellow, jointly affiliated with the Department of Materials Science and Engineering and the Department of Aeronautics and Astronautics at the Massachusetts Institute of Technology. He is also a visiting scholar at Hopkins Extreme Materials Institute at Johns Hopkins University. His research interests span high-throughput materials discovery for extreme environments and developing materials for next-generation propulsion and thermal protection systems. He obtained his Ph.D. from Johns Hopkins University and his M.S. from Arizona State University, both in Material Science and Engineering. Suhas was awarded the 2020 Diversity Leadership Award for his LGBTQ+ in STEM advocacy efforts and the 2018 Engaged Scholar Award for his teaching and mentoring efforts from Johns Hopkins University.