MECHANICAL & MATERIAL COLLOQUIUM

Additive Manufacturing: A Journey Through Processing Routes, Materials, and Applications

by Tanaji Paul (MME/FIU)

Additive manufacturing (AM) offers transformative advantages over conventional manufacturing for producing small-volume components with complex geometries critical to defense, aerospace, and marine applications. This colloquium provides an overview of ongoing research at the Cold Spray and Rapid Deposition (ColRAD) Laboratory at Florida International University (FIU), highlighting efforts in both solid-state deposition and melting–solidification approaches. Key areas of focus include cold spray, wire arc directed energy deposition (WDED), friction stir additive manufacturing (FSAM), and digital light printing (DLP) with investigations spanning diverse feedstock forms such as powders, wires, rods, and slurries. Research encompasses metals, polymers, ceramics, and composites, aiming to understand processing fundamentals and expand the performance envelope of advanced materials. The presentation will also highlight real-world applications, student-led successes, and workforce development initiatives that prepare the next generation of engineers. Finally, emerging research directions will be outlined, emphasizing pathways toward scalable, robust, and application-ready additive manufacturing technologies.

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Dr. Tanaji Paul is an Assistant Professor in the Department of Mechanical and Materials Engineering at Florida International University. He earned his Ph.D. in Mechanical Engineering from Oklahoma State University, Stillwater. His research encompasses additive manufacturing of metals and alloys using techniques such as cold spray and wire arc directed energy deposition. Previously, he also worked on ultrasonic vibration assisted casting of metal matrix composites and spark plasma sintering of metallic alloys. His current research seeks to establish fundamental scientific correlations between processing parameters, their role on the structural characteristics of alloys, and their mechanical behavior. These efforts are geared towards development of lightweight, high-strength metallic alloys and their composites for structural applications and improvement of their lifetime by enhancing their resistance to environmental degradation. Dr. Paul's research has attracted support from the Defense Advanced Research Projects Agency (DARPA), National Center for Manufacturing Sciences (NCMS), and Army Research Office (ARO). He is an elected Senior Member of the National Academy of Inventors and a Co-inventor on 6 United States Patents. As a co-author he has published more than 50 research articles, mentored research students, and delivered several oral presentations at international conferences.

Place:
EC 1113

Time:
2:00-3:15 PM
Sept. 23, 2025

https://mme.fiu.edu/seminar-schedule

For questions or suggestions, contact Colloquium Organizers Dr. Jiuhua Chen (chenj@fiu.edu) or Dr. Pezhman Mardanpour (pmardanp@fiu.edu)