

SUBMIT AN ABSTRACT FOR THE FOLLOWING SYMPOSIUM

ADDITIVE MANUFACTURING

Additive Manufacturing Materials, Processes and Applications for Energy Industry

Additive manufacturing (AM) have grown significantly over recent years in energy sectors including power generation and oil & gas industries, due to the advantages for supply chain development, economic and performance enhancements, and cost saving. The examples include the high-temperature components in gas turbines, fuel and structural components in nuclear reactors, and corrosion resistant off-shore drilling components. Compared to other industries, energy industry has its unique material and process requirements to be able to deploy AM in the commercial scale. Large-scale AM is desired to accommodate the size requirement of the energy infrastructure. The cost-effective choices of materials and processes are of greater consideration in power complicated service environments, ranging from high temperature, corrosive conditions to radiation damages, are often seen in different energy systems. Material performance data across a wide range of environments are needed. Beyond the challenging material and process requirements, the full adoption of AM in all energy sectors are hindered by the lack of available codes and standards. To overcome these challenges, it is essential to develop new materials and processes, gather relevant material data, and advance qualification, inspection, and testing technologies. These efforts are necessary to meet the higher demands of materials in energy environments and enable their wide use in various applications.

This symposium invites talks focusing on developing, understanding, and qualifying AM materials that target the environments in specific energy sectors, including nuclear fission and fusion, oil and gas, natural gas, coal, solar, and wind. To accelerate industry adoption and material qualification, we welcome talks from energy industry to cover code/standard development and industry demonstration.

This symposium will integrate invited and contributed talks in the following categories. It also seeks to include industry perspectives in the forms of talks and open conversations.

- Advanced AM materials and material architectures for energy industries, including high-temperature materials, corrosion resistant materials, radiationresistant materials, functionally-graded materials.
- Advanced AM processes for energy industries, including various powder and wire based laser AM technologies, arc-welding based AM, cold spray, friction stir based AM, large-scale AM technologies.
- Material behavior in energy environments: shortterm and long-term evolution of microstructure and material properties of AM materials in the energy environments (e.g., mechanical properties, precipitation and phase transformation, radiation damage, corrosion and oxidation, creep, creepfatigue, thermal aging).
- Qualification and testing: recent progress of advanced characterization, non-destructive evaluation, accelerated testing, model-based qualification and quality acceptance protocol to support the standardization and material qualification.
- Performance monitoring and qualify control: In-situ performance monitoring of AM structures in energy environments, sensors.
- Industry adoption: recent progress on code and standard development; industry demonstration of AM in energy applications

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