

Applications of Phase Change Heat Transfer and Materials in Energy and Power Systems

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PLACE: C3024

Donuts and coffee will be available for consumption 15 minutes before the talk.

ABSTRACT: Phase change heat transfer, e.g., boiling and condensation, melting and freezing, can be found in many energy and power systems such as thermal and nuclear power generation, oil production and transportation, renewable energy storage, and thermal management of electronics. The phase change heat transfer processes often play a key role in determining the efficiency, safety and reliability in these systems. The industries need innovative design and accurate prediction of these phase change processes which in turn requires good understanding of the fundamental heat transfer mechanisms. In this seminar, I will discuss applications of phase change heat transfer and phase change materials (PCMs) in the following energy and power systems. (1) Boiling of water as coolant in nuclear power generation. I will discuss a boiling test facility and a set of new experimental data. (2) Phase change materials for thermal energy storage and thermal management. Examples include temperature control of battery packs in electric vehicles, and novel thermal insulation for subsea pipelines. (3) Freezing-thawing processes in the ground and thermal protection of infrastructure in cold regions. (4) Icing protection of energy production facility (wind turbines, offshore platform) and power transmission infrastructure. I will also discuss potential research collaborations between mechanical engineers and physicists that could lead to significant new advances in each of these applications.

ALL ARE WELCOME!!!