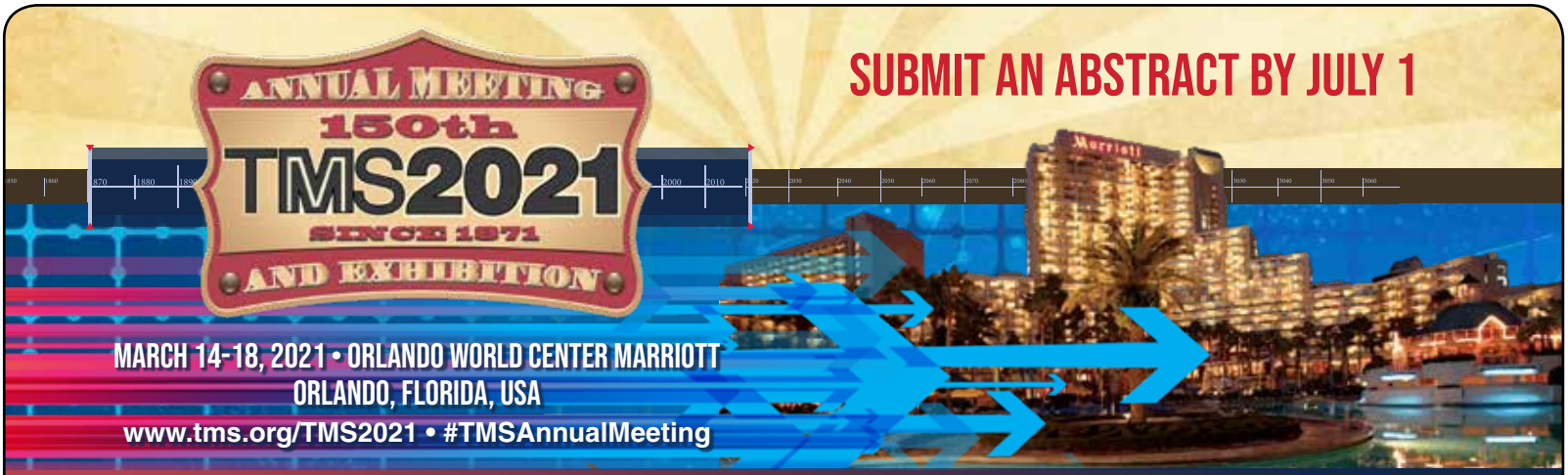

SUBMIT AN ABSTRACT TO:

MATERIALS PROCESSING

PHONONS, ELECTRONS AND DISLONS: EXPLORING THE RELATIONSHIPS BETWEEN PLASTIC DEFORMATION AND HEAT

While the simple fact that plastic deformation efficiently converts mechanical energy (work) into heat is well known, many questions regarding this (and related) phenomenon are still unanswered or are not universally accepted. For example, what factors (composition, microstructure, etc.) determine the fraction of work which is converted into heat, what are the mechanisms of converting deformation to heat, and what is the role of "phonon radiation" of dislocations as they move at high velocities? Numerous research topics are affected since these heating effects can lead to helpful or harmful plastic instabilities during high-strain-rate deformation (Hopkinson bar tests, plate-impact tests, shock-deformation), shear-banding, friction stir welding/processing, machining, ball milling, etc. The topic of heat generation is typically addressed by using thermocouples or infrared cameras to record the temperature rise associated with a corresponding plastic strain, but usually, there is less clarity or discussion around the mechanisms of heat generation. In conditions where visual or contact access is not possible, indirect methods to infer heating history or simulations are required, which includes assessment of degrees of dynamic recovery or recrystallization as an indicator of local heating history. On the flip-side, it is becoming increasingly clear that the mere presence of dislocations in the lattice can be used to engineer the thermal and electrical transport of materials relevant to applications as diverse as thermoelectrics, optoelectronics, topological insulators, and superconductors. An emergent theoretical construct known as a "dislon" has recently been introduced, which promises to explain such diverse manifestations of the interactions between phonons, electrons and dislocations.

This symposium aims to provide a forum for reporting experimental, computational, and theoretical methods to understand both heat generation and heat transfer in materials, through the interactions between phonons, electrons, and dislons. Research exploring the fundamental physics, in association with experimental validation, is also encouraged.

ORGANIZERS

Aashish Rohatgi, Pacific Northwest National Laboratory, USA
Sean Agnew, University of Virginia, USA
Thomas Bieler, Michigan State University, USA

SYMPOSIUM SPONSORS

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Abstract Deadline is July 1, 2020. Submit online at www.programmaster.org/TMS2021.

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