



The Oak Ridge Chapter of ASM presents:

Dr. Zhenzhen Yu

Associate Professor, Colorado School of Mines

Multi-Principal Element Alloy as Brazing Filler for Ni-base Superalloys

Thursday, September 9th, 2021 (7:00 PM ET)
Virtual Event via RingCentral

<https://meetings.ringcentral.com/j/1461008021?pwd=amhxRUpGUjKZjc5NklLMG9qdWV1dz09>

Password: 723143

Abstract: Multi-principal element alloys have a vast compositional space available. Their tendency to form entropy-stabilized, simple solid solution phases, and to exhibit composition-dependent sluggish diffusion characteristics, make them potential candidates as filler metals for similar and dissimilar joining. One application example is brazing of Ni-base superalloys. A new HEA filler, Mn₃₅Fe₅Co₂₀Ni₂₀Cu₂₀, was designed using a high-throughput computational methodology. The microstructural evolution during brazing was systematically investigated by ex-situ and in-situ characterizations and kinetic analysis. An optimal shear strength comparable to that of the Alloy 600 substrate was achieved in the braze joints. Solidification mechanism and segregation behavior of Mn₃₅Fe₅Co₂₀Ni₂₀Cu₂₀ was further investigated via in-situ synchrotron x-ray diffraction at millisecond temporal resolution and thermodynamic calculations. Four stages were identified during solidification of laser-melted Mn₃₅Fe₅(CoNiCu)₂₀, including (I) dendritic and (II) interdendritic solidifications, (III) homogenization through interdiffusion, and (IV) marginal interdiffusion during final cooling. Cu and Mn segregation into interdendritic region served to increase lattice parameter disparity between dendritic and interdendritic regions during Stage II. Solid-state interdiffusion in Stages III-IV facilitated composition homogenization.

Speaker Bio: Prof. Zhenzhen Yu is an associate professor in the department of Metallurgical and Materials Engineering (MME) at Colorado School of Mines, and the Director of the Center for Joining, Welding and Coatings Research (CWJCR). She received MS and PhD degrees from the Department of Materials Science and Engineering at the University of Tennessee, Knoxville and B.S. degree from Mechanical Engineering at East China University of Science and Technology. Before joining CSM, she worked as a postdoctoral research associate at Oak Ridge National Laboratory. Her research interests include weld metallurgy, development of similar/dissimilar joining technologies, weld consumables design, and simulation and characterization of transient material states. She received the National Science Foundation Faculty Early Career Development CAREER Award in 2019 and McKay-Helm Award in 2020.

Virtual Meeting Details:

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Password: 723143

Date: Thursday, September 9th, 2021

Schedule:

6:30pm – virtual meeting opens / social hour

7:00pm – feature presentation

Cost: FREE for all attendees

Virtual Meeting Details:

- Or iPhone one-tap :

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