NC STATE UNIVERSITY

Materials Science & Engineering

Spring 2021 Early Career Lecture Series in Materials Science & Engineering

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High-entropy Ceramics

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11 am EST; Zoom Link

Abstract: Disorder is both intrinsic to all materials, and also a route to enhanced functionality. A combination of 1) high chemical disorder and 2) metal-nonmetal bonding offers a new direction for thermal protection materials, wear-resistant coatings, batteries, and catalysts. Engineering these materials for applications demands an understanding of the mechanisms governing synthesizability and other entropy-driven behavior, a challenging task often resolved within a limited context or neglected altogether. A simple modeling paradigm is presented that has already led to the discovery of new metal-carbide systems achieving high hardness values as predicted. Additional factors within the framework are being considered to address the delicate balance between entropy maximization and induced enthalpic penalties that become important in other ceramic systems.

Biography: Corey Oses is a Postdoctoral Fellow at Duke University in the Department of Mechanical Engineering and Materials Science. He received a Ph.D. in Materials Science from Duke University in 2018 and a B.Sc. in Applied and Engineering Physics from Cornell University in 2013. His research interests include design of data-driven thermodynamic descriptors for disordered materials and development of autonomous frameworks enabling materials informatics. More information can be found at coreyoses.com.