

High Entropy Oxides: Opportunities and Challenges

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High entropy oxides (HEOs) are an emerging class of single-phase solid solutions consisting of multiple cations in near-equiatomic proportion. The field of HEOs has rapidly grown in the last half a decade to include numerous compositions along with several crystallographic structures, e.g., rocksalt, fluorite, perovskites, spinels, pyrochlores, etc. Consequently, the extensive compositional flexibility of HEOs offers the possibility to tailor a plethora of functional properties. Examples of some of their improved functionalities compared to conventional oxides are the enhanced electrochemical cyclic stability, superior ionic conductivity, higher catalytic activity, greater thermal insulation and exotic magneto-electronic properties. This being the opportunities that can be harvested for future applications, researchers working on HEOs face multiple challenges in terms of precise understanding of their atomistic features, such as local elemental distribution, distortion and bonding characteristics. Hence, the talk will provide an overview of the current state of research on HEOs along with the possible approaches to tackle the aforementioned challenges benefitting future research endeavors.