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Exploration of High-Entropy Alloys for Irradiation Applications

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High-entropy alloys (HEAs) have become the focus of research in many fields often exhibiting unique thermal, mechanical, chemical, and electrical properties. In addition to this, several HEAs have been shown, in both modeling and experiments, to exhibit enhanced resistance to radiation damage. While several theories have been proposed to explain this behavior, often owing to the chemical complexity and diffusion properties of HEAs, such theories require substantial experimental study over a range of HEA composition to develop a fundamental understanding. To accelerate the development of HEAs for irradiation applications, among others, researchers at the University of Wisconsin-Madison are employing high-throughput (HTP) techniques for synthesizing, testing, and characterizing arrays of different HEA compositions. These HTP techniques are then coupled with both traditional and in situ irradiation experiments and characterization methods, which add depth to the HEA development process and further the ability to link atomic-scale features with macroscopic properties.

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