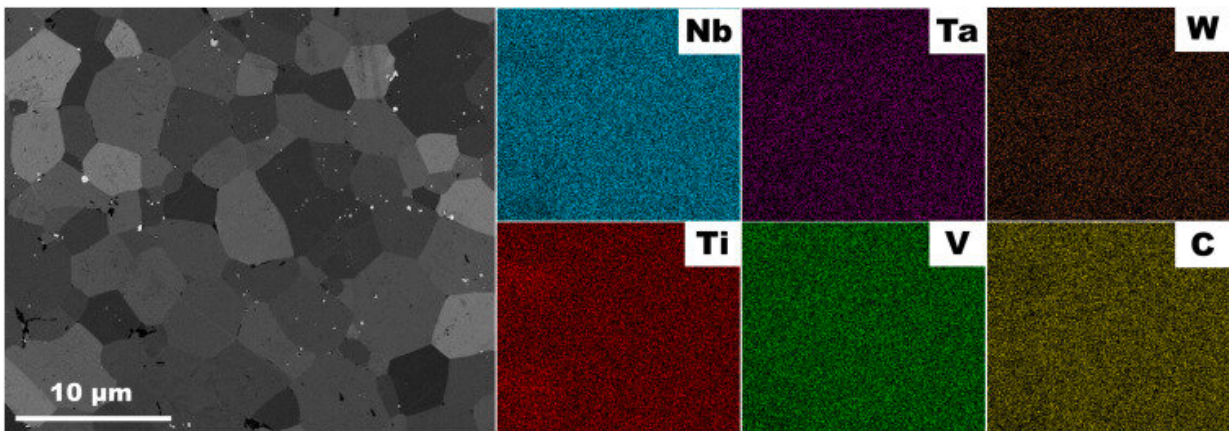


Study confirms high irradiation resistance of high-entropy carbide ceramics

April 6 2022, by Liu Jia



Credit: *Journal of the European Ceramic Society* (2022). DOI: 10.1016/j.jeurceramsoc.2022.01.061

A new study on the irradiation evaluation of high-entropy carbide ceramics (HECCs) has demonstrated their remarkable irradiation resistance at high temperature, shedding new light on the basic understanding of irradiation mechanisms of HECCs. The study was published in *Journal of the European Ceramic Society*.

HECCs are characterized by multiple metal elements in an equal atomic ratio in the cation position, while the C atoms occupies the anion position. Due to the entropy stabilization effects, HECCs exhibit excellent resistance to high-temperature creep, corrosion and oxidation.

Additionally, they possess potential irradiation resistance. Thus, HECCs are expected to be used as candidate structural materials for [harsh environments](#).

Recently, researchers at the Institute of Modern Physics (IMP) of the Chinese Academy of Sciences have obtained new results on the development and irradiation evaluation of HECCs.

In the experiment, researchers selected (WTiVNbTa) C_5 HECC as a model material and synthesized the samples with high relative density by the Spark plasma sintering (SPS) method. For the sintered bulks, all the elements were homogeneously distributed at the micrometer level.

Researchers then carried out the irradiation resistance evaluation of (WTiVNbTa) C_5 on the Heavy Ion Research Facility in Lanzhou (HIRFL), the Low Energy Highly-Charged Ion Accelerator Facility (LEAF) and the 320 kV platform for multi-discipline research with highly charged ions.

The study confirmed that HECCs possess excellent resistance to irradiation induced amorphization, and the dynamic annealing effect at high temperature can greatly reduce the structural damage caused by irradiation. Moreover, according to the experimental results, the [irradiation](#) induced microstructure damage and its influence on the mechanical properties of HECCs were discussed.

More information: Yabin Zhu et al, Microstructural damage evolution of (WTiVNbTa) C_5 high-entropy carbide ceramics induced by self-ions irradiation, *Journal of the European Ceramic Society* (2022). [DOI: 10.1016/j.jeurceramsoc.2022.01.061](https://doi.org/10.1016/j.jeurceramsoc.2022.01.061)

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