**Ce doping effects on high-entropy alloy superconductor**

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High-entropy alloys (HEAs) composed of five or more principal elements represent a novel type of functional materials. Recently, Ta-Nb-Hf-Zr-Ti HEA superconductor has been discovered, which has simple body-centered cubic (bcc) structure and superconducting transition temperature (*Tc*) of ~8 K [1,2]. HEA superconductors exhibit a large critical current density (*Jc*) of >1 MA cm-2, and robust superconductivity to irradiation-induced disorder [3]. In this study, we have examined the Ce doping effects on HEA superconductor (Ta-Nb-Hf-Zr-Ti) with various doping concentrations (0.1 wt%, 0.5 wt%, 1 wt%, 2 wt%, 4 wt%, 8 wt%). The chemical composition and element distribution of Ce-doped HEA samples were investigated by energy dispersive x-ray spectrometer (EDS) measurements. We found that the homogeneous distribution of Ce dopant depends on the doping concentration. The electrical properties of Ce-doped HEA superconductors were measured as a function of temperature to investigate the influence of Ce doping on the superconducting transition temperature. We will discuss the relation between the local distribution of Ce dopants and superconductivity in HEA superconductors.

[1] P. Koželj et al., “Discovery of a Superconducting High-Entropy Alloy” Physical Review Letters 113, 107001 (2014).

[2] Liling Sun and R. J. Cava, “High-entropy alloy superconductors: Status, opportunities, and challenges” Physical Review Materials 3, 090301 (2019).

[3] Soon-Gil Jung et al., “High critical current density and high-tolerance superconductivity in high-entropy alloy thin films” Nature Communications 13, 3373 (2022).