Poster 22

Superconductivity of high-entropy-alloy-type compounds

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Since the discovery of superconductivity in a high-entropy alloy Ti-Zr-Hf-Nb-Ta [1], exploration of new HEA superconductors has been a growing topic in the field of superconductivity [2]. The common strategy to design HEA is alloying five or more elements with a range of 5–35% in concentration of each element. Our focus has been material development of new compound superconductors having a HEA-type site; the examples are shown in Fig. 1(b-e), where one of crystallographic sites is high-entropy-alloyed with different five elements [3–5]. Since the introduction of a HEA-type site in compounds result in highly disordered chemical bonds and electronic states. To find out new pathway to designing novel unconventional superconductors or high-performance practical-use materials, clarification of the effects of the HEA-site on superconductivity should be understood. We have investigated the effects of the presence of HEA-type site on superconducting properties for various compounds [3–7]. Through the reserch, we found that the HEA effects on superconducting properties are depending on dimensionality of crystal structure. For some cases, positive effects, such as an increase in critical current density and an improvement of bulk nature of superconductivity. In addition, unexpected modification of supercondcuting states were found in specific heat experiments in $TrZr_2$. In this presentation, we will show an overview on superocnducting properties of HEA-type compound superconductors and recent results on superconducting properties in highly disordered systems.

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