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【636】 Effect of electron count and chemical complexity in high-entropy alloy (HEA) superconductors

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HEAs are a new class of materials that consist of several principal elements arranged on simple lattices, stabilized by the high-configurational-entropy of the random mixing of the elements. In this presentation, we will show that the properties of this superconducting high-entropy alloy are strongly related to the valence electron count and that the superconducting transition temperatures T_c of these alloys fall between those of analogous crystalline and amorphous materials. We find that despite the large degree of randomness and disorder in these alloys, the superconducting properties are nevertheless strongly dependent on the chemical composition and complexity. We argue that high-entropy alloys are excellent model systems for understanding how superconductivity and other collective quantum states evolve from crystals to amorphous solids.

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