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Prospects for the development of materials based on high-entropy oxides, carbides, and oxycarbides stable at high temperatures

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The importance of high-entropy materials is dictated by the requirements of high-temperature technologies related to the problems of aviation and aerospace engineering, nuclear power engineering, metallurgy, and microelectronics. The significant interest in the materials mentioned is explained by a combination of unique physical and chemical properties such as high mechanical strength and hardness and chemical and thermal stability. This review gives analysis of studies that address the physicochemical properties of high-entropy oxides, carbides, and oxycarbides at high temperatures and illustrates the potential use of these results for the synthesis and operation of a broad range of materials under high-temperature treatment. It is shown that the search for optimal solutions for the development of refractory materials based on multicomponent oxides, carbides, and oxycarbides requires the use of integrated physicochemical approach, involving information on the thermodynamic properties, phase equilibria, and vaporization processes. Bibliography — 247 references.