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Undercooling of Refractory High-Entropy Alloy

Authors : Liang Hu

Abstract : The innovation of refractory high-entropy alloy (RHEA) formed from refractory metals W, Ta, Mo, Nb, Hf, V, and Zr was firstly implemented in 2010 to obtain better strength at high temperature than conventional HEAs based on Al, Co, Cr, Cu, Fe and Ni. Due to the refractory characteristic and high chemical activity at elevated temperature, electrostatic levitation technique has been utilized to fulfill the rapid solidification of RHEA. Several RHEAs consisting W, Ta, Mo, Nb, Zr have been selected to perform the undercooling and rapid solidification by ESL. They are substantially undercooled by up to 0.2TL. The evolution of as-solidified microstructure and component redistribution with undercooling have been investigated by SEM, EBSD, and EPMA analysis. According to the EPMA results of composing elements at different undercooling levels, the chemical distribution relevant to undercooling was also analyzed.

Keywords : chemical distribution, high-entropy alloy, rapid solidification, undercooling
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