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Microstructures and properties evolution of spray-deposited

Al-Zn-Mg-Cu-Zr alloys with scandium addition

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Abstract

In this work, the effect of Sc content on the microstructures and mechanical properties of Al-Zn-Mg-Cu-Zr alloys prepared using spray deposition was studied. Microstructure observations reveal that not only the grain size, but also the coarse secondary phase can be refined by Sc addition through the formation of a hybrid structure coupled by η -MgZn₂ and Al₃(Sc, Zr) phases near and at the grain boundaries. It is inferred that the primary Al₃(Sc, Zr) particles can act as nucleation sites for the η -MgZn₂ phase during the deposition process. With the increase of Sc content, the continuous secondary phase at the grain boundaries converts gradually into small discontinuous particles, which contributes to the considerable improvement in tensile strength and elongation. The alloy with 0.2 wt.% Sc exhibits excellent combinations

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