

Special Issue Reprint

New Frontiers in Materials Design for Laser Additive Manufacturing

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In recent years, the industry has started to use parts printed by powder-based laser additive manufacturing (LAM) when precision and good mechanical properties are required. Applications can be found in the aerospace, automotive, and medical sectors. However, the powder materials available are often inadequate for contemporary processing tasks, and often generate process instabilities as well as porosities and defects in the resulting parts. This Special Issue, “New Frontiers in Materials Design for Laser Additive Manufacturing”, focuses on advances in material design and the development of laser additive manufacturing. Of particular interest are original papers dealing with metal and polymer powders for laser powder bed fusion or directed energy deposition. In this Special Issue, we are especially interested in answering the following questions:

How can laser process parameters and material properties be adapted to the LAM process via the matrix modification (e.g., alloying, doping, compounding) of powders? How can powder properties like flowability, wetting, porosity, or (heterogeneous) nucleation be adapted to the LAM process via the surface modification of powders? How may calorimetry, high-speed videography, pyrometry, and online spectroscopy, as well as modeling, contribute to understanding dynamics of melting and recrystallization, in addition to the lateral distribution of the thermal process window?

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