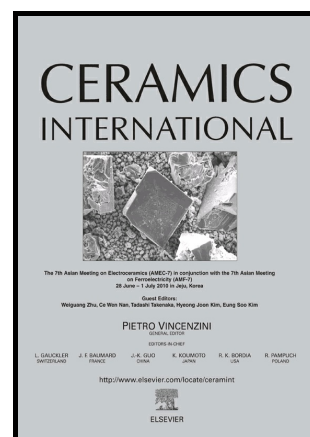


Preparation of Alumina/Polystyrene Core-Shell Composite Powder via Phase Inversion process for Indirect Selective Laser Sintering Applications

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**Preparation of Alumina/Polystyrene Core-Shell Composite Powder via Phase
Inversion process for Indirect Selective Laser Sintering Applications**

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Abstract

Indirect selective laser sintering (SLS) is one of the promising additive manufacturing (AM) methods that can process conventionally difficult or even impossible materials such as ceramics. In this work, an innovative phase inversion technique is used to fabricate spherical alumina particles coated with a thin layer of polystyrene (PS). Then, indirect SLS is used to fabricate green parts from the 6wt % PS coated alumina particles via a Nd:YAG laser. The assessed SLS process parameters were the scan speed, laser power, scan spacing, pulse frequency, and pulse width. The characterization of the Al_2O_3/PS core-shell composite particles was described using techniques including SEM (for morphology), FT-IR (for chemical bonding at the interfaces), TGA (for mass loss), and DSC (for glass transition temperature, T_g). 3D green parts were then fabricated using proper process parameters as a proof of the feasibility of using SLS technique for Al_2O_3/PS core-shell composite powder. The results showed that using a Nd:YAG laser with less absorption by alumina and PS provides greater penetration through a powder bed. In addition, the

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