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Additive manufacturing of ceramic structures

Ceramic materials as an important group in engineering materials have been intensively investigated by different additive manufacturing techniques. In our recent research, we have used different techniques including digital light project/stereolithography, robocasting and direct laser sintering/melting in fabrication of ceramic structures. In this presentation, I will focus on fabrication of different ceramic structures by robocasting. Robocasting or free-form extrusion is a simple technique for forming a 3D structure layer-by-layer. We have developed different starting precursors (or pastes) for different structural and functional ceramic materials, such as alumina, zirconia and electro-ceramics including magnetic ferrite, high-Tc superconductor

and ferroelectrics. More recently, we have studied how to fine tune viscosity and printing parameters for fabrication of ceramic structures with refined structures of a feature size in order of 50-60 μm . This technique is also suitable for fabrication of structures with multi-materials. More recently, we have developed a novel paste, which can lead in fabrication of flexible greenbody. Fully-dense structure can be achieved after sintering. We have developed a suitable procedure for complex geometry which can be obtained after sintering under a suitable mould, so that we might fabricate 3D structures which are not easily obtained by simple 3D printing process. The novel process has demonstrated for fabrication for multi-material structures.

Biography

Jun Ding is the Professor at the Department of Materials Science & Engineering, National University of Singapore. He has been working on functional materials (particularly magnetic materials) over 25 years.

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