

3D Ink Jet Printing of Ceramics and Biomaterials

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Abstract

Ink jet provides a versatile technique for the positioning of precise volumes of fluid. This can be used as a micromanufacturing tool, if the required materials can be delivered in liquid form. We have developed highly concentrated particle suspensions of a range of sub-micron ceramic materials with viscosities sufficiently low for use in commercial industrial ink jet printers. By choosing a suitable strategy to solidify the slurries, 3-dimensional structures can be produced by overprinting. The influence of fluid properties on printing characteristics will be discussed and example ceramic structures printed and sintered will be described.

It is also possible to use the methods developed for printing inorganic suspensions to print concentrated suspensions of living cells. Preliminary results will be presented of work using ink-jet printing to manufacture 3-dimensional cellular constructs for bioreactor and tissue engineering applications.

Author Biography

Brian Derby is Professor of Materials Science in the School of Materials, University of Manchester, UK, since 2000. He received his BA (1978), and PhD (1981) in Materials Science from Cambridge University, UK. Faculty position, University of Oxford, Dept. of Materials 1984 - 1999. 2 Patents, over 130 publications in peer-reviewed publications.