Title: Direct ink writing of highly bioactive glasses

Authors: Amy Nommeots-Nomm, Peter D. Lee, Julian R. Jones

PII: S0955-2219(17)30529-0
DOI: http://dx.doi.org/doi:10.1016/j.jeurceramsoc.2017.08.006
Reference: JECS 11401

To appear in: *Journal of the European Ceramic Society*

Received date: 8-11-2016
Revised date: 27-7-2017
Accepted date: 2-8-2017

Please cite this article as: Nommeots-Nomm Amy, Lee Peter D, Jones Julian R.Direct ink writing of highly bioactive glasses.*Journal of The European Ceramic Society* http://dx.doi.org/10.1016/j.jeurceramsoc.2017.08.006

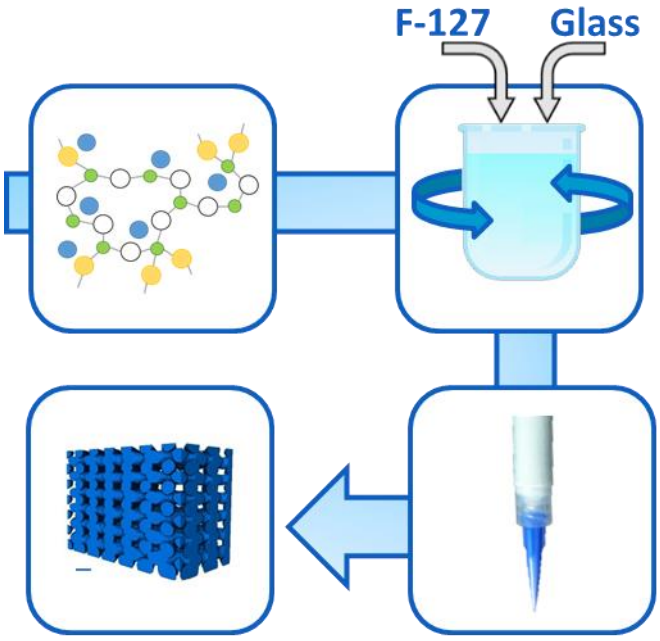
Direct ink writing of highly bioactive glasses

Amy Nommeots-Nomm[1,2], Peter D. Lee[2], Julian R. Jones[1*]

[1] Department of Materials, Prince Consort Road, Imperial College London, London, SW7 2BP, UK

[2] School of Materials, University of Manchester, Manchester, M13 9PL, UK

Graphical Abstract



Abstract

Direct ink writing (DIW) or Robocasting, is an additive manufacturing technique that offers the opportunity to create patient specific bioactive glass scaffolds and high strength scaffolds for bone repair. The original 45S5 Bioglass® composition crystallises during sintering and until now, robocast glass scaffolds contained at least 51.9 mol% SiO_2 or B_2O_3 to maintain their amorphous structure. Here, ICIE16 and PSrBG compositions, containing < 50 mol% SiO_2, giving silicate network connectivity close to that of 45S5, were robocast and compared to 13-93 composition. Results showed Pluronic F-127 can be used as a universal binder regardless of glass reactivity and that particle size distribution affected the ink "printability". Scaffolds with interconnects of 150 µm (41-43% porosity) had compressive strengths of 32-48 MPa, depending on the glass composition. Robocast scaffolds from