

Development of a light-weight electrically conductive copper (Cu)-bee pollen composite ink for 3D printing

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Electrically conductive inks for additive manufacturing or “3D printing” have received substantial attention in the past few years in various printed electronics applications. Here, we perform a formulation study on development of a light-weight electrically conductive copper (Cu)-bee pollen composite ink for 3D printing. Addition of naturally occurring bee pollen microparticles to an aqueous Cu suspension reduces the overall density of final extruded structure yet increases the suspension strength. Emulsification of the aqueous suspension ink with a fast evaporating oil phase significantly reduces the sample yield strength, by which the rheological ink processability is much improved while the particle percolation in the continuous phase is maintained. Furthermore, the final extruded structure of ink in the form of emulsion has much lower density due to the increased porosity as a consequence of oil evaporation.