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Modeling the fusion of cylindrical bioink particles in post bioprinting structure formation[1] MATT MCCUNE, ASHKAN SHAFIEE, GABOR FORGACS, IOAN KOSZTIN, University of Missouri — Cellular Particle Dynamics (CPD) is an effective computational method to describe the shape evolution and biomechanical relaxation processes in multicellular systems. Thus, CPD is a useful tool to predict the outcome of post-printing structure formation in bioprinting. The predictive power of CPD has been demonstrated for multicellular systems composed of spherical bioink units. Experiments and computer simulations were related through an independently developed theoretical formalism based on continuum mechanics. Here we generalize the CPD formalism to (i) include cylindrical bioink particles often used in specific bioprinting applications, (ii) describe the more realistic experimental situation in which both the length and the volume of the cylindrical bioink units decrease during post-printing structure formation, and (iii) directly connect CPD simulations to the corresponding experiments without the need of the intermediate continuum theory inherently based on simplifying assumptions.

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