Electronic Supplementary Material (ESI) for Lab on a Chip.

Supporting Information

Effective Bioprinting Resolution in Tissue Model Fabrication

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Supplementary Materials

The numerical approach to obtain the final shape of the injected droplet on the substrate can be simulated by an analytical approach. In micrometer droplets, the surface tension force is dominant and the droplet deformation is negligible due to the gravitational force.[1] Therefore, the final shape of a droplet sitting on a substrate can be approximated as a sphere cap, depicted in **Figure S1**. To find a mathematical correlation between the projection radius of the droplet on the surface r, based on the droplet volume V_d, and droplet-substrate contact angle α, we can estimate the volume of a sphere cap V_c as:

$$V_c = \frac{\pi h^2 (3R - h)}{3}$$

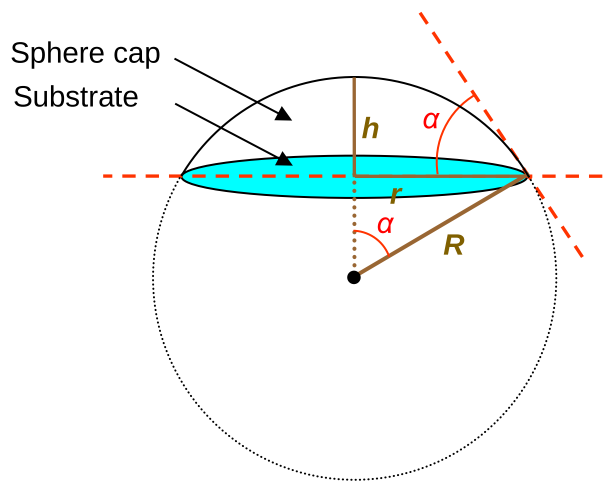

Figure S1. Schematic of a droplet final shape on a substrate in microscale with negligible gravitational force. R, h, r, and α are the radius of the fictitious full-sphere based on the final droplet shape, the sphere cap height, the sphere cap radius, and the contact angle for the droplet sitting on the substrate, respectively.

The sphere cap height h and radius of the fictitious full-sphere based on the final droplet shape R can be calculated based on the droplet projection radius on the substrate and the droplet contact angle:

$$R = \frac{r}{\sin\alpha}$$

$$h = \frac{r}{\sin\alpha}(1 - \cos\alpha)$$

Manipulation of the above equations yields:

$$r = \sqrt[3]{\frac{V_c\ (\sin\alpha)^3}{\frac{\pi}{3}(1-\cos\alpha)^2(2+\cos\alpha)}}$$

To examine the accuracy of the analytical approach presented, the values for the droplet projection on the substrate for the contact angles studied in **Figure 2d**, were obtained using the equation above. For the results in **Figure 2d**, the droplet volume was 190852 μm^3. Using the droplet volume, the droplet projections can be obtained using the analytical equation for various contact angles.

References

1. Z. Zapryanov, S. Tabakova Dynamics of Bubbles, Drops and Rigid Particles Series: Fluid Mechanics and Its Applications, Vol. 50.