FM14L_11509

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Layer Thickness Distribution of Thin-Film Ink-Jet Printed Structures.

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We studied the layer formation process of sessile droplets of a colloidal suspension, deposited by piezo-electric ink jet printing. An approximate numerical model was developed, together with scaling laws. The model solves the convection-diffusion equation for a drying droplet, assuming the liquid–air interface has the shape of a spherical cap. The number of input parameters in the model was kept to a minimum, still describing the relevant physical phenomena for a range of materials. The numerical predictions and underlying assumptions of the model were compared with experiments, using a water-based colloidal silver suspension. They were found to be in reasonable agreement with each other. Based on experiment and simulation, different drying regimes were distinguished. The approximate model and scaling laws provide useful quantitative insight into the drying process of ink-jet printed droplets. This can be used for manufacturing of printable inorganic conductors.

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