

Effect of Marangoni Flow on Surface Roughness and Packing Density of Inkjet-printed Alumina Film by Modulating Ink Solvent System.

Yeonjun OH^{*,**}, Jihoon Kim^{*}, Young Joon Yoon^{*}, Ho Gyu Yoon^{**}, Jong-hee Kim^{*}

Future convergence ceramic division, Korea institute of ceramic engineering and technology^{*}
Department of materials science and engineering, Korea university^{**}

Abstract : We have fabricated alumina thick films by inkjet printing technology. Two different types of ink system were formulated in order to understand their evaporation behaviors and their evaporation effects on the powder distribution on the surface during inkjet-printed alumina thick films. Single solvent system was formulated with N,N-dimethylformamide(DMF), which led to coffee ring effects which non-uniformly distributed alumina particles on the substrate during the ink evaporation. However, Co-solvent system which consists of both Water and DMF produced relatively uniform distribution of the particles on the substrate. We believe that these two different distributions of alumina particles are attributed to the ink fluid flow directions in the ink droplets ejected from the different ceramic ink system. We have modulated inkjet parameters such as dot-to-dot distance, line-to-line distance, jetting velocity and jetting drop size in order to find out the optimum condition for the printing of alumina thick films from two different ink systems. The surface roughness, microstructures and dielectric properties of these inkjet-printed alumina thick films were investigated.

Key words : inkjet printing, Alumina, Co-solvent system, packing density, surface roughness