Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Electrodeless electro-hydrodynamic gentle printing of personalized medicines[1] BORIS KHUSID, EZINWA ELELE, YUEYANG SHEN, New Jersey Institute of Technology — Drop-on-demand (DOD) principle appears to be a particular promising approach for manufacturing personalized treatments carefully tailored to a patient's genetic background. The authors have recently developed a DOD method for gentle printing of personalized medicines. A fluid is infused into an electrically insulating nozzle to form a pendant drop. A sufficiently strong voltage pulse is applied to external electrodes to stretch the pendant drop until it touches an electrically insulating film and forms a liquid bridge. As the liquid bridge is intentionally formed in an unstable configuration, it breaks up, creating two drops, one on the film and the other hanging from the nozzle. To prove the validity and versatility of the method, experiments are conducted on fluids whose viscosity, conductivity, dielectric constant, and surface tension vary over a broad range, respectively: 1-1045 cP, 0.02-290 μS/cm, 9-78, and 41-72 dyn/cm. We present a scaling analysis that captures the essential physics of drop evolution and provides the critical design guidelines. The work was supported by NSF Engineering Research Center on Structured Organic Particulate Systems.

[1]The work was supported by NSF Engineering Research Center on Structured Organic Particulate Systems.

Boris Khusid
New Jersey Institute of Technology

Date submitted: 28 Jul 2010 Electronic form version 1.4