Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Building micro-soccer-balls with evaporating colloidal fakir drops

HANNEKE GELDERBLOM, ÁLVARO G. MARÍN, Physics of Fluids, University of Twente, The Netherlands, ARTURO SUSARREY-ARCE, ARIE VAN HOUSSELT, LEON LEFFERTS, Catalytic Processes and Materials, University of Twente, The Netherlands, HAN GARDENIERS, Mesoscale Chemical Systems, University of Twente, The Netherlands, DETLEF LOHSE, JACCO H. SNOEIJER, Physics of Fluids, University of Twente, The Netherlands — Drop evaporation can be used to self-assemble particles into three-dimensional microstructures on a scale where direct manipulation is impossible. We present a unique method to create highly-ordered colloidal microstructures in which we can control the amount of particles and their packing fraction. To this end, we evaporate colloidal dispersion drops from a special type of superhydrophobic microstructured surface, on which the drop remains in Cassie-Baxter state during the entire evaporative process. The remainders of the drop consist of a massive spherical cluster of the microspheres, with diameters ranging from a few tens up to several hundreds of microns. We present scaling arguments to show how the final particle packing fraction of these balls depends on the drop evaporation dynamics, particle size, and number of particles in the system.

Hanneke Gelderblom
Physics of Fluids, University of Twente, The Netherlands

Date submitted: 30 Jul 2013 Electronic form version 1.4