

### Supplementary Movie Captions

Movie S1: The movie shows an image stack made up of various slices obtained from SLS technique. The green and yellow-orange pixels correspond to the glycerol and oil respectively. The spheres were sectioned in a 2-D plane and therefore appear as black (non-fluorescent) discs of various sizes depending on the distance between the slicing plane and a parallel plane spanning a great circle of the sphere. The stack corresponds to a flat oil-glycerol interface formed at  $Q=0.9 V_0/s$

Movie S2: The movie shows time evolution of oil in three dimensions for  $Q=1.7 V_0/s$  (imbibition).

Movie S3: The movie shows time evolution of oil in three dimensions for  $Q=3.1 V_0/s$  (imbibition).

Movie S4: The movie shows an image stack made up of various slices obtained from SLS technique for  $Q=3.1 V_0/s$  (drainage). The oil droplets appear as yellow-orange arbitrary shaped discs in all the 2-D slices.

Movie S5: The movie illustrates the fluctuation update protocol for a 2-D slice. Each frame of the movie corresponds to the time evolution of the map.