Magnetically tuned pattern selection of thin ferrofluid droplets

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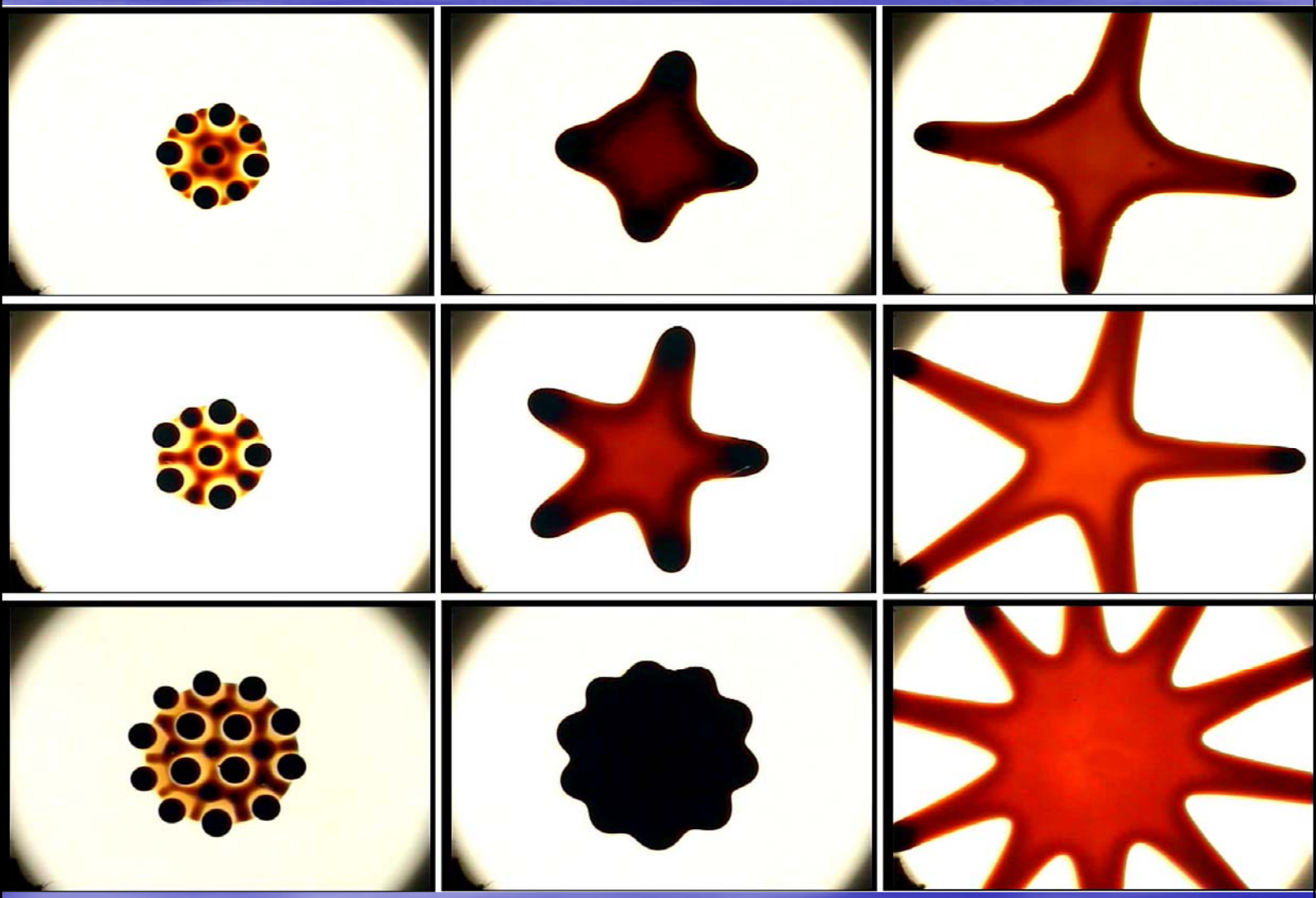

We report an experimental study of a fingering pattern formation which occurs during the spreading of an immiscible thin ferrofluid drop subjected to a radial magnetic field [1]. A magnetically induced selection mechanism is illustrated by typical time evolutions of a drop of various initial diameters. First, a perpendicular field is applied generating an array of numerous sub-scale droplets as shown in the first column. Soon after this, the perpendicular field is turned off, and the radial field is immediately switched on. This leads to the collapse of the tiny peaks, followed by the coalescence of the sub-scaled droplets, creating a symmetrically perturbed structure. Subsequently, fingers start to spread out due to the action of a radial magnetic force. This demonstrates the capability of tuning the ultimate number of growing fingers by prescribing a proper initial perturbation.

[1] C.-Y. Chen, Y.-S. Yang, J. A. Miranda, *Phys. Rev. E* , in press.