Droplet Spreading: varying viscosity

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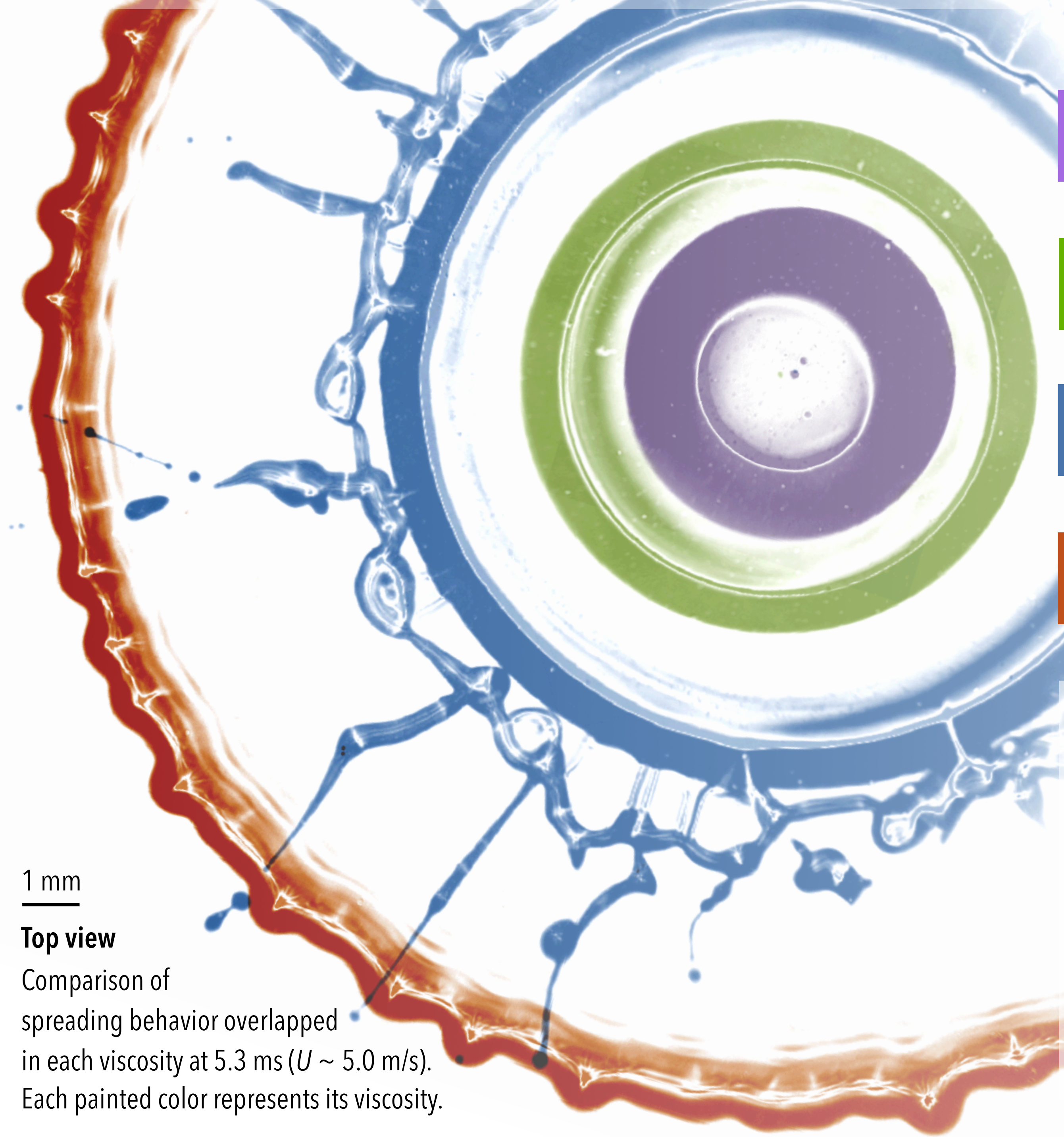
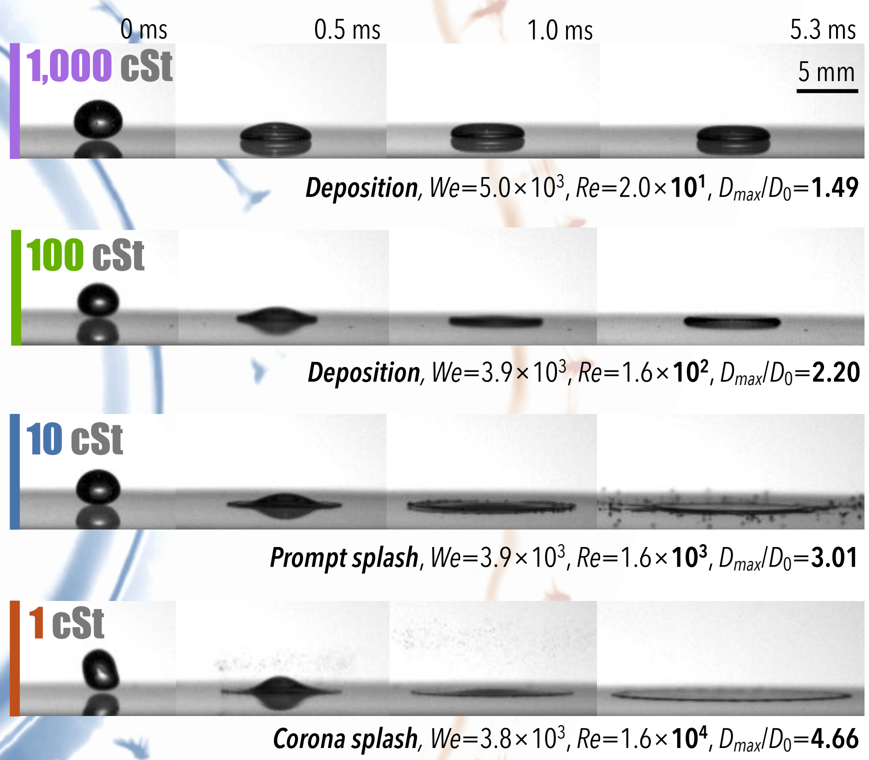
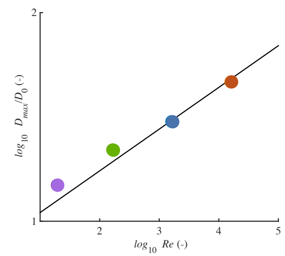


Top view
Comparison of spreading behavior overlapped in each viscosity at 5.3 ms ($U \sim 5.0$ m/s). Each painted color represents its viscosity.



Droplet spreading on a glass surface is recorded by two synchronized high-speed cameras. Viscosity of droplet is varied from **1** to **1,000** cSt. As shown in upper-right panels, the flow pattern is obviously varied from ***Deposition*** to ***Splash***[*1] (see also main picture). Impact velocity is almost the constant, thus dominant parameter here is Reynolds number Re (namely, ***viscous force***) . For the maximal deformation of an impacting droplet, D_{max}/D_0, **viscous force plays an important role** as well. The impact number P, which is the measure of the ratio of the capillary force and the viscous force formulated as $We/Re^{0.8}$, is larger than 1 for all conditions. It means that the description by capillary force no longer holds. A scaling law $D_{max} \propto D_0 Re^{0.2}$, which takes viscous effect into account, should be adopted instead[*2, *3].



References: [*1]YARIN, A. L. (2006), [*2]CLANET, C., et al. (2004), [*3]EGGERS, J. et al. (2010)