

Drying of colloidal dispersions

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As a colloidal dispersion dries the dispersion transitions from a fluid to a solid. This typically occurs non-uniformly with fluid regions co-existing with consolidated regions. The final dried morphology depends upon the drying process and can include height non-uniformities as well as cracks. In this presentation the reasons for non-uniform drying will be covered and the effect of drying fronts propagating horizontally across films will be shown.

The capillary pressure in the film can cause the formation of cracks. The drying film develops a fracture toughness: From a small value when fluid to a well established value when consolidated. The dynamics of crack propagation as well as a method of measuring parameter scalings for the fracture toughness will be shown.

The final film profile can display a well defined edge region called a coffee ring. A correlation between the initial volume fraction and contact angle will be established to predict whether a coffee ring forms. The application of this to diagnostics in blood drops will be discussed