

Making a deposit: advances in our understanding of the coffee ring effect

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The evaporation of liquid droplets has received significant research interest due to its fundamental significance in a variety of industrial and engineering applications such as inkjet printing, microscale and colloidal patterning, DNA microarray technologies and the manufacture of Q/OLEDs. One of the key reasons for this is the familiar ‘coffee-ring’ effect that refers to the ringlike stain left behind after a solute-laden droplet evaporates on a surface and its potential use in depositing specific patterns. While deceptively simple, there is a wealth of complexity in the problem, primarily embedded in the – potentially coupled – aspects of evaporation, the associated liquid flow and particle transport. These difficulties have limited the vast majority of existing models to only treating the simplest possible cases of asymptotically-flat, circular droplets evaporating in isolation. This has dramatically limited their applicability in real-world contexts, in which these simplifications are generally broken. In this talk, we will discuss recent advances that attempt to broaden the existing theory with an eye on the ultimate goal of dynamically controlling the process to suit a specific application.