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Salt deposition patterns from evaporating drops compared to the ‘coffee ring’ effect.

M.F.L. Schut, van der Waals-Zeeman Institute, IoP, University of Amsterdam, Amsterdam, The Netherlands

J. Desarnaud, van der Waals-Zeeman Institute, IoP, University of Amsterdam, Amsterdam, The Netherlands

M. Prat, Institut de Mécanique des Fluides de Toulouse (IMFT), France

D. Bonn, van der Waals-Zeeman Institute, IoP, University of Amsterdam, Amsterdam, The Netherlands

N. Shahidzadeh-Bonn, van der Waals-Zeeman Institute, IoP, University of Amsterdam, Amsterdam, The Netherlands

The “coffee-ring effect” [1] is an appealing problem as it is a frequent everyday observation, but the deposition of colloidal particles can also influence for instance printing and coating applications. Previous studies indicates that the deposition pattern of colloidal suspensions depends on contact line pinning [1], the presence of Marangoni flows [2], the thermal conductivity of the substrate [3], and the shape of the colloids [4].

Besides the coffee ring, in everyday life we are also very familiar with crystal deposits resulting from evaporation of drops of salt solutions such as calcium deposits on bathroom walls. Although the problem has been much studied for colloidal suspensions, for salts there are much less results. We experimentally study the effect of the combined wetting properties and thermal conductivity of the substrate on deposition of salt crystals from solutions.

We use both Sodium Chloride and Calcium Sulfate solutions, and image the crystallization process and end deposits on various hydrophobic and hydrophilic surfaces. We observe for both salt solutions that the final deposition pattern is mostly very different from the coffee ring, and depends strongly on the wetting properties of the substrate rather than the thermal conductivity.

[1] Deegan et al. *Nature* **1997**, 389, 827-829

[2] H. Hu and R.G. Larson, *J. Phys. Chem. B* **2006**, 110, 7090-7094

[3] Ristenpart et al. *PRL* **2007**, 99, 234502

[4] Yunker et al. *Nature* **2011**, 476, 308-311