

Pattern Formation in Drying Drops of Colloidal Copper Sulphate Solution on Glass Surface

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Abstract

Evaporation of droplets is an interesting problem which has aroused a keen interest in the scientific community. The behavior of a drying droplet on solid substrates produces everyday phenomena like the coffee stain effect, deposition of lime scales on walls etc. It is also very important in many scientific and industrial procedures. Among several varieties of systems, a droplet of colloidal gel containing an inorganic salt presents a very interesting class. In this work we study a rich variety of self-assembled patterns generated by the evaporation of a droplet of colloidal copper sulphate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) solution, having different concentrations, on a glass surface. Our results show that the patterns are dendritic in nature having multiple branches. A simple aqueous solution of copper sulphate does not produce the same morphology. The pattern formation process may be controlled by several parameters such as the particle size, structure of the crystalline salt, droplet size, ambient temperature and humidity.

Keywords: Crystallization, Dendritic Pattern, Evaporating Droplet, Gelatin, Salt