

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Role of Entropy in Self Purification of Colloidal Clusters Under Optical Trap HREEDISH KAKOTY, RAJARSHI BANERJEE, CHANDAN DAS-GUPTA, AMBARISH GHOSH, Indian Inst of Science — Controlling the structure of a collection of colloidal particles under external forces can be helpful in developing soft nanomaterials with novel functionalities. How external impurities organize within such confined systems is of fundamental and technological interest, especially when the system sizes are so small that even a single dopant can interact with an appreciable fraction of the system. Experiments to specifically probe the behaviour of dopants have been relatively few. Here, we have used a defocused laser beam to form colloidal clusters in 2D with precise control over the size and phase of the assembly. Crucially, we could inject and subsequently study the behaviour of foreign dopants within these crystallites, revealing surprising position dependence in the fate of dopants getting either spontaneously expelled or permanently internalized. We have modelled this system numerically and found that this phenomenon arises due to the subtle interplay between the effects of external confinement and role of entropy in the thermodynamics of small assemblies of interacting particles. The studies presented here could be extended to host colloids of higher degree of complexity and the insight gained could be useful in designing and assembling new type of soft nanomaterials.

Hreedish Kakoty
Indian Inst of Science

Date submitted: 11 Nov 2016

Electronic form version 1.4