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Central spot shaped deposition from colloidal droplet evaporation under enhanced Marangoni effect FEI DUAN, JUNHENG REN, Nanyang Technological University — Evaporation of a colloidal droplet on a substrate can result in a residual deposit near the three-phase line, driven the capillary flow, and form coffee ring. Under a higher evaporation rate, the more nonuniform temperature can be generated at liquid-gas interface of the sessile droplet. The evaporation induced Marangoni flow can be observed, the particles can be carried to move toward the centerline and aggregate at the center area of the droplet. We have developed a three-dimensional (3D) diffusion limited aggregation Monte Carlo method to simulate the dried patterns under the enhanced Marangoni effect. The particle motion is controlled by calculating the probabilities of six moving directions. The interactions among particle to particle, particle to liquid, particle to substrate have been taken into account. The results show that the final dried residuals can be formed to with a central spot inside a thin coffee ring by enhancing the Marangoni flow during drying a colloidal droplet. The results are comparable to the deposited patterns under the reduced pressure evaporation conditions. The drying patterns have been analyzed as well.

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