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Absence of power-law scaling in the dendritic crystal growth of ammonium chloride ANDREW DOUGHERTY, Lafayette College — We report measurements of the dendritic crystal growth of NH_4Cl from supersaturated aqueous solution at small supersaturations, with a goal of understanding the origin of the sidebranching structure. The early detection of sidebranches requires measurements of small deviations from the smooth steady state shape, but that underlying shape is not precisely known at the intermediate distances relevant for sidebranch measurements. We find that no simple power law describes the average crystal shape, the average sidebranch amplitude, or the average sidebranch envelope. Instead, the effective power law exponents appear to increase steadily as a function of distance from the dendritic tip. Comparisons of the amplitude of sidebranches with that predicted by models of noise-driven sidebranching require careful measurements of materials parameters such as the capillary length. Previous published estimates for this material varied by over a factor of 20. We report new measurements of the capillary length and find $d_0 = 0.224 \pm 0.005$ nm. Based on those new measurements, we find that the amplitude of the sidebranches in this system is larger than expected from numerical models.

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