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# Sodium chloride crystallization from thin liquid sheets, thick layers, and sessile drops in microgravity

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**Abstract**

Crystallization from aqueous sodium chloride solutions as thin liquid sheets, 0.2-0.7 mm thick, with two free surfaces supported by a wire frame, thick liquid layers, 4-6 mm thick, with two free surfaces supported by metal frame, and hemispherical sessile drops, 20-32 mm diameter, supported by a flat polycarbonate surface or an initially flat gelatin film, were carried out under microgravity on the International Space Station (ISS). Different crystal morphologies resulted based on the fluid geometry: tabular hoppers, hopper cubes, circular [111]-oriented crystals, and dendrites. The addition of polyethylene glycol (PEG-3350) inhibited the hopper growth resulting in flat-faced surfaces. In sessile drops, 1-4 mm tabular hopper crystals formed on the free surface and moved to the fixed contact line at the support (polycarbonate or gelatin) self-assembling into a shell. Ring formation created by sessile drop evaporation to dryness was observed but with crystals 100 times larger than particles in terrestrially formed coffee rings. No hopper pyramids formed. By choosing solution geometries offered by microgravity, we found it was possible to selectively grow crystals of preferred morphologies.

**Keywords:** A1. Crystal morphology, A1. Skeletal crystals, A1. Hopper pyramids, A1. Dendrites, A2. Microgravity conditions, B1. Sodium chloride.