

Abstract Submitted
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Freezing and Melting of Salt Hydrates Next to Solid Surfaces Probed by Infrared-Visible Sum Frequency Generation Spectroscopy¹
EMMANUEL ANIM-DANSO, YU ZHANG, ALI DHINOJWALA, The University of Akron — Understanding the freezing of salt solution near solid surfaces is important in many scientific fields. Here, we have used sum frequency generation (SFG) spectroscopy to study the freezing of NaCl solution next to a sapphire substrate. During cooling we observe two transitions; the first transition corresponds to segregation of concentrated brine next to the sapphire surface as we cool the system down into the phase region where there is a coexistence of ice and brine. At this transition, the intensity of the ice-like peak decreases, suggesting the disruption of hydrogen bonding by sodium ions. The second transition corresponds to the formation of NaCl hydrates with abrupt changes in both SFG intensity and the sharpness of spectral peaks. The similarity in the position of the SFG peaks with those observed using IR and Raman spectroscopy indicates the formation of NaCl·2H₂O crystals next to the sapphire substrate. Freezing and melting of other hydrates will be discussed.

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