

“Raman Microscopy of frozen salt-water”

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Bio:

Subha is a Post-doctoral Researcher in the Dept. of Chemistry, Syracuse University. His research activities include surface and volume Raman analysis of frozen seawater for characterizing the physical properties of the surface. He also works on depth profile in Raman microscopy and its limits. Between 2016 –18, Subha was a Post-doc at SUNY Polytechnic Institute, and he worked with Prof. M. Huang on single-ion instrument development and ion-induced luminescence of organic scintillator films. He had a PhD (2015) from Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland, on characterization of ionic liquid micro-propulsion systems for nano-satellites. He completed his Master's from Indian Institute of Technology (IIT), Kharagpur, India in 2011. He also worked for Indian Space Research Organization (ISRO) for two years as a Scientist (2006 – 2008).

Abstract:

Salty-ice' has long been recognized as an important reaction medium for environmental deposits in arctic regions. For any reactant, it is important what it sees (and how much) on the surface of the ice. Freezing exclusion of saltwater is an important mechanism that governs how ice-air interface dictates the reactivity of the surface. When frozen, salt from the solution is excluded to the surface in a concentrated solution, what is generally called 'brine'. The surface is, thus, not completely icy, but is wetted with the salt solution. As the temperature decreases below Eutectic point, the liquid brine turns into solid hydrohalites. Our lab focuses on characterization of the seawater-mimicking salty-ice surface using Raman spectroscopy and mapping. In this seminar, the properties and composition of the surface of salty-ice will be discussed based on Raman mapping. Liquid brine, pure ice, water and hydrohalite, all have their characteristic Raman spectra. We developed some analytical methods to use these spectral signatures to identify the fractional composition of the components of the surface, especially the evolution of salt concentration in the brine and how a small inclusion of organic substances, such as Humic acids dramatically change the composition.