

# 792<sup>nd</sup> ASRC Seminar

**Date:** 10月30日 (金) 14:00 ~ 15:30

**Location:** 先端基礎研究交流棟 2階ロビー

**Speaker:** 佐崎 元氏

(北海道大学低温科学研究所)

**Title:** Surface Melting of Ice Visualized by  
Advanced Optical Microscopy  
「光分解光学顕微鏡で見る氷の表面融解」

## Abstract:

Surfaces of ice crystals are covered with thin liquid water films, so called quasi-liquid layers (QLLs), even at temperatures below the melting point of ice ( $0^{\circ}$  C). Surface melting of ice plays critically important roles in a wide range of phenomena, including slipperiness of ice, frost heave, conservation of tissues and foods, and electrification of thunderclouds. Hence, unraveling the surface melting of ice is indispensable for understanding these phenomena.

QLLs on ice crystals have been studied for long years by various spectroscopy techniques. However, we succeeded in directly visualizing QLLs for the first time by our advanced optical microscopy [1], which can visualize 0.37-nm-thick elementary steps (growing ends of ubiquitous molecular layers) on ice crystal surface. We found that two types of QLLs with different morphologies (droplets and thin layers) appear spontaneously on ice crystal surfaces. In this seminar, we will show physical properties [2] and thermodynamic origin [3, 4] of the two types of QLLs. We will also present how QLLs are closely related with ozone-hole formation [5].

[1] G. Sazaki, et al., PNAS, 109, 1052-1055 (2012).

[2] K. Murata, et al., Phys. Rev. Lett., 115, 256103-1-5 (2015).

[3] H. Asakawa, et al., PNAS., 113, 1749-1753 (2016).

[4] K. Murata, et al., PNAS, 113, E6741-E6748 (2016).

[5] K. Nagashima, et al., Cryst. Growth Des., 18, 4117-4122 (2018).

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