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Fluorescence and confocal microscopy studies of the ice surface - antifreeze protein interactions. N. PERTAYA, C.L. DI PRINZIO, L. WILEN, Ohio University, Athens, OH, E. THOMSON, J.S. WETTLAUFER, Yale University, CT, P.L. DAVIES, Queen's University, ON, Canada, I. BRASLAVSKY, Ohio University, Athens, OH — Biomineralization is a phenomenon in which biological material influences mineral growth on the molecular level. A compelling example involves antifreeze proteins (AFPs) known to prevent fish and insects from freezing. AFPs have many potential applications in agriculture, biomedical science, and can be used as a model platform to understand biomineralization processes for future nanotechnology applications. Here we describe a new approach to study the interaction between AFPs and ice using fluorescence and confocal microscopy combined with a unique ice growth cell. After conjugating green fluorescent protein (GFP) to Type III AFP, we imaged the fluorescence signal around and inside of the ice crystals that emerged from the cooled AFP-GFP solution, and have observed an enhanced fluorescence signal at the edge of the ice crystal. In a second cell we observed a dramatic change in the ice growth morphology when AFPs were introduced into an initially pure system. Further developments of these methods will permit the direct imaging of the location and concentration of the AFPs on ice surfaces and enable a better understanding of their operation. Supported by CIHR, the Bosack and Kruger Foundation, Ohio and Yale Universities.

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