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Diffusion, adsorption and incorporation of antifreeze glycoprotein molecules at the ice/water interface HIROYUKI NAKAYA, SALVADOR ZEPEDA, YUKIHIRO UDA, SHUICHIRO MATSUMOTO, Hokkaido University, ETSURO YOKOYAMA, Computer Center, Gakushuin University, YOSHINORI FURUKAWA, Hokkaido University — Antifreeze glycoproteins(AFGP) are known to inhibit ice crystal growth by adsorbing to the interface. But, there is no direct observation of the distribution of AFGP molecules around the interface of the growing ice crystal. In order to observe the growing ice/water interface, one-directional growth experiments of ice crystal growth were carried out in AFGP solution. AFGPs were labeled with fluorescent markers to see the distribution of AFGP molecules. We obtained video image of the distribution of AFGP molecules near the growing ice/water interface by using fluorescent microscopy. Incorporation and accumulation of AFGP molecules at the interface were clearly observed, and strongly depend on the growth rate of the ice crystal. We also observed the diffusion field of AFGP molecules from the ice interface and calculated diffusion and segregation coefficients. We found that AFGP molecules strongly adsorb to the growing ice crystal interface, and incorporate between grain boundaries, but found little evidence for incorporation into the crystal lattice. This is contrary to previous paradigms for AFGP function.

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