



האוניברסיטה העברית בירושלים
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המכון לביוכימיה, מדעי המזון והתזונה

הרצאת התקדמות לתואר שלישי

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הנושא:

Ice Growth Inhibition Dynamics of Various Types of Ice Binding Proteins

המפגש יתקיים

ביום ג', 24 יוני 2014, בשעה 10:00

מועדון סגל

Abstract:

Ice-binding proteins that aid the survival of freeze-avoiding, cold-adapted organisms by inhibiting the growth of endogenous ice crystals are called antifreeze proteins (AFPs). The binding of AFPs to ice causes a separation between the melting point and the freezing point of the ice crystal (thermal hysteresis, TH). The nature of AFPs binding to ice is still debated in this field of research; mainly whether these proteins bind to ice irreversibly or reversibly. TH produced by hyperactive (from insects) AFPs is an order of magnitude higher than that produced by a moderate (from fish) AFP. The basis for this difference in activity remains unclear. Here we have tested the irreversible binding of AFPs to ice, and compared the time-dependence of TH activity for both hyperactive and moderately active AFPs using a custom-made nanoliter osmometer and a novel microfluidics system linked to a fluorescence microscope. We found that AFPs bind to ice irreversibly, and moderate AFPs exhibit different dynamics than hyperactive AFPs. These dynamics includes time-dependence of TH activity, binding kinetics and crystal morphology. Basal ice plane binding is the distinguishing feature of antifreeze hyperactivity, which is not strictly needed in fish that require only ~ 1 °C of TH. We found a correlation between the accumulation kinetics of the hyperactive AFP at the basal plane and the time sensitivity of the measured TH. These findings may help to develop new applications for better control of ice growth and limiting the damages of ice in the food industry.

סגל וסטודנטים מוזמנים להשתתף