

Physics and Physical Oceanography MSc Seminar

Temperature Dependence of Acoustic Properties of Natural Snail Mucus by Brillouin Spectroscopy

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DATE: Thursday, April 2, 2020

TIME: 3:00 pm

Place: Brightspace Online Room (see link below)

<https://ysu-na.youseeu.com/sync-activity/invite/555550/3472c3bfaab9ad3ae876c1b7c3386599?lti-scope=d2l-resource-syncmeeting-list>

ABSTRACT: Brillouin light scattering spectroscopy was used to study the elastic properties of natural gastropod mucus for temperatures $-11^{\circ}\text{C} \leq T \leq 52^{\circ}\text{C}$. For $-2.5^{\circ}\text{C} \leq T \leq 52^{\circ}\text{C}$, a single Brillouin peak due to a longitudinal acoustic wave propagating in the mucus was observed in the spectra, the velocity of which decreased with decreasing temperature at a rate of $\sim 2 \text{ m/s/}^{\circ}\text{C}$. At $T = -2.5^{\circ}\text{C}$, a second peak, attributed to a quasilongitudinal acoustic mode of ice I_h , appeared in the spectra. For temperatures $T \leq -2.5^{\circ}\text{C}$, these two peaks persisted, with the velocities of the associated modes both increasing with decreasing temperature. The intensities of these peaks, however, were found to be inversely related - the “mucus” peak intensity decreased rapidly with decreasing temperature while that of the “ice” peak increased. Sound absorption for the “mucus” mode obtained from the Brillouin peak linewidth and longitudinal wave velocity displayed an exponential increase with decreasing temperature over the entire range probed. Together, these results suggest the occurrence of a transition from a viscous uid to a mixed solid-liquid state at $T = -2.5^{\circ}\text{C}$ due to the formation of ice I_h crystallites in the mucus.

ALL ARE WELCOME!