



**University
of Victoria**

Centre for
Advanced
Materials &
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Technology

CAMTEC SEMINAR

TITLE: *Laser Refrigeration of Physiological Buffers with Solid State Nanocrystals*

SPEAKER: **Dr. Peter Pauzauskie**
Department of Materials Science & Engineering,
University of Washington

DATE: Tuesday, January 12th, 2016

TIME: 3:00 – 4:00 pm

LOCATION: ECS 660

Abstract: Solid-state laser-refrigeration materials have been developed in the last 10 years that are capable of cooling to cryogenic temperatures without mechanical vibrations to enable a range of advanced optoelectronic sensing applications. The current world record for cooling bulk (Czochralski) single-crystals in vacuum via anti-Stokes photoluminescence is 91K when starting from room temperature (298K). However, to date it has remained an open question whether solid-state laser refrigeration materials can also be used to refrigerate condensed phases such as liquid water and physiological buffers. In this presentation I will demonstrate recent results showing it is possible to cool colloidal dispersions of nanocrystalline ytterbium-doped yttrium-lithium-fluoride materials (Yb:YLiF₄) in liquid water based on calibrated control experiments with ion-implanted silicon nanowires. The temperature of water surrounding individual YLF crystals is observed to decrease by nearly 20°C from room temperature based on interferometric measurements of a particle's Brownian motion using a single-beam laser trapping instrument, suggesting a range of potential future applications for solid-state laser refrigeration materials.

Please contact Dr. Reuven Gordon for further information (250) 472-5179.