Photocathodes for Free Electron Lasers

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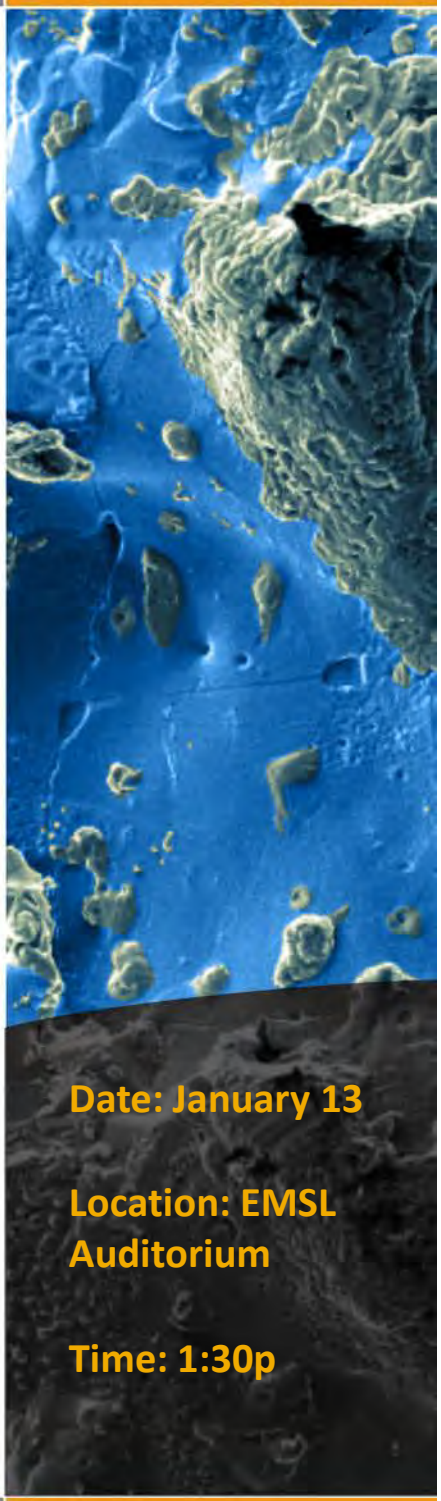
Frontiers in Chemical Imaging
Seminar Series



Presented by…

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Abstract

Free Electron Lasers (FELs) have a peak brightness well over 10^{10} times that of a 3rd generation synchrotron and can produce fully coherent ultra-fast x-ray pulses into the sub-fsec regime. As such, FELs represent the ideal source for examining matter on fundamental length and time scales. The next evolution of FELs will involve increasing the repetition rate into the MHz regime, increasing the time averaged flux and the number of experiments that can simultaneously operate at the same time reducing the physical scale and therefore cost of the machine to the minimum possible.

The performance of an FEL is directly linked to the quality of the electron beam; typically this beam is produced by a laser-driven photocathode, before acceleration to relativistic velocity in a linear accelerator. A lower emittance beam can be used to lase at higher energy, or can be used to reduce the physical scale of the FEL, by reduction of the electron energy and hence the length and cost of the accelerator.

In this talk, I will give **an overview of FEL physics** as it affects photocathode design and **show how through engineering of the electronic structure of the photocathode, potentially huge advances can be made in FEL performance.**

Date: January 13

Location: EMSL Auditorium

Time: 1:30p