Recent rapid advances in single-particle EM, and cryo-EM in particular, have enabled macromolecular structure determination at near-atomic and even atomic resolution. In EM data processing, the Nyquist frequency dictates the highest resolution of information in an image. However, this upper-limit only stands for a single image. In a set of images from the same object but with random inter-frame translation, the ensemble actually contains information beyond the Nyquist frequency. In this talk, I will introduce an algorithm to retrieve such information in 2D and 3D space. Its application in single-particle electron microscopy will lead to density reconstruction at higher resolution.

We will demonstrate a large variety of instruments from renaissance Europe and describe their internal configuration and how it relates to their pitch, volume, and timbre. These will include forerunners of modern orchestral string, keyboard, wind, and percussion instruments as well as instruments that were considered obsolete by the Baroque period, including viola da braccio, viola da gamba, shawms, bassanelli, spinettino, recorders, serpent, rackett, tartold, sackbutts, rebecs, krummhorns, carnival whistles, pipe and tabor, and others. We will also explain renaissance conventions for notating pitch and duration.
Monday October 24th, 2016
Dr. Christopher Butenhoff, Portland State University
“Understanding Recent Changes in Atmospheric Levels of Methane Using an Inverse Modeling Approach”

Methane (CH₄) is the second most important greenhouse gas with a radiative forcing of ~1 W/m² including both direct and indirect effects and a global warming potential of 28 over a 100-year time horizon. Unlike carbon dioxide, whose rate of growth in the atmosphere has remained positive and increased in recent decades mainly due to the combustion of fossil fuels, the behavior of atmospheric methane is considerably more complex and is much less understood on account of the variability of its emissions including wetlands, ruminants, rice agriculture, fossil fuels, and biomass burning sources. After sustained growth during most of the 20th century, the CH₄ growth rate declined during the 1980s to near-zero and even negative values in the early 2000s. With some surprise, the growth rate rebounded in 2007. The causes for this behavior are uncertain and the subject of much current debate. Importantly, accurate climate forecasts depend on resolving this issue. In this seminar I will discuss our recent work that has attempted to unravel this puzzle using a Bayesian inversion method. In this method we use a global threedimensional model of atmospheric chemistry and transport along with surface measurements of atmospheric CH₄ and its isotopes to infer changes in the global methane budget over decadal time scales. Among other changes we find evidence for a recent increase in the fugitive emissions of methane from the production of oil and natural gas.

Monday November 14th, 2016
Dr. Steven Jacques, Oregon Health & Science University
“The optics of Biological Tissues and Its Importance in Biomedical Laser Applications”

The term "Tissue optics" refers to the optical properties of biological tissues that affect the transport of photons into, through, and out of tissues. Such light transport allows both photon absorption that yields surgical and therapeutic effects in the tissue and photon escape that yields diagnostic metrics for characterization of the tissue. This talk will discuss how tissue optics specifies the dosimetry for photochemical, photothermal and photomechanical effects. The talk will also discuss how photon interaction with biological structures on the nano-, micro- and macro- scales affects optical diagnostics.
Monday November 21st, 2016  
Dr. Karumbu Meyyappan, Intel Corp.  
“Impact of Environment on Electronics”

There is widespread coverage of impact of environmental conditions on human health. These conditions can also impact the reliability performance of electronic products albeit at a lower concentration level. There is sufficient evidence reported in literature and online articles on the reliability risks and associated field failures due to pollutants seen in environment. This seminar covers some of the evidences of field failures and pollutants that could be driving the failures, thereby supporting the literature. High level details of the failure mechanisms driving the failure modes will be discussed. To manage the risks and prevent it from happening in the field, it is important to have qualification tests that can reflect field reliability risks. There will be a review of fingerprinting efforts to better understand the environmental conditions and also methods to recreate these environments in laboratory settings. Existing gaps and opportunities to improve the assessments will be discussed as part of the seminar.

Monday November 28th, 2016  
Dr. David Ji, Oregon State University  
“Non-Graphitic Carbon Anodes for Alkali Metal-Ion Batteries Beyond Lithium”

Energy storage is the missing enabler to facilitate the widespread installation of renewable-but-intermittent solar and wind energy. There are two primary metrics for stationary energy storage: cost and cycling life, where the latter is also about the cost, indeed. It is thus a must to rely on Earth-abundant elements, which rules out lithium-based devices for the stationary purposes, as lithium is rare and its supply is geopolitically challenged. This warrants attention for Na-ion batteries (NIBs) and K-ion batteries (KIBs). For metal-ion batteries, the choice of anode often determines the fate of the battery commercialization, as anode typically determines battery’s cycling life as well as safety features. Considering the cost and performance, non-graphitic carbon anodes are the leading candidates for NIBs and KIBs. To date, much effort has been devoted to preparing such carbons from various unique organic precursors. However, there has been a dearth of knowledge on the basic correlation between the local structures of carbon anodes and their Na (K)-ion storage behavior, where the alkali-metal-cation storage mechanism in hard carbon and soft carbon is still a debated topic. In this talk, I will introduce new insights on storage mechanisms and design principles of hard carbon anodes for NIBs based on the structure-capacity correlation revealed by experimental and
theoretical studies. I will also discuss K-ion storage properties of major carbons, including graphite, which proves incorrect an old assumption between graphite and potassium.