OPTICAL SCIENCE & ENGINEERING
University of New Mexico

# SPECIAL OSE SEMINAR


## Dr. Susumu Takahashi

**Associate Professor, University of Southern California**


**Monday, May 1, 2017 from 4:00 PM to 5:00 PM at SMLC, Rm. 102**

## Nanoscale electron spin resonance spectroscopy using NV centers in diamond


**Abstract:**

Magnetic resonance (MR), such as nuclear magnetic resonance (NMR) and electron spin resonance (ESR), can probe the local structure and dynamic properties of various systems, making them among the most powerful and versatile analytical methods. However, their intrinsically low sensitivity precludes MR analyses of samples with very small volumes; *e.g.*, more than $10^{10}$ electron spins are typically required to observe ESR signals at room temperature. A vast improvement in the current limits of MR will enable the imaging of structures and conformational changes of molecules in solution at the single molecule level.

A nitrogen-vacancy (NV) center in diamond is a promising candidate for applications in room temperature magnetic sensing with single spin sensitivity. In this presentation, we will discuss ESR spectroscopy using on NV centers in diamond. By employing ESR and double electron-electron resonance (DEER) techniques, we investigate impurities and coherence in diamond. We also demonstrate ESR of several electron spins using NV-based ESR spectroscopy. Moreover, we will discuss development of a high-frequency NV-based ESR system. This work is supported by NSF and the Searle Scholar program.


**Biography:**

Dr. Takahashi earned his Ph.D. in Physics from University of Florida, then he moved to University of California Santa Barbara as a postdoctoral scholar. Prior to Ph.D., he worked for Hitachi to research semiconductor devices. Dr. Takahashi joined the faculty at University of Southern California in 2010, received tenure in 2017. He is currently an Associate Professor in the Department of Chemistry and Department of Physics & Astronomy. He is a recipient of the 2012 Searle Scholarship.

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