Texas A&M University Nano/Micro Seminar Series Presents:

Progress toward Atomic Scale Imaging in Living Cells with Diamond

by Philip Hemmer

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Room 103 Zachry

Abstract

There has always been a desire to image biological processes in living cells on the atomic scale. In recent years there has been much progress toward this goal and a number of subwavelength imaging schemes have been developed. I have analyzed these schemes and found that they are mainly limited by the properties of the molecule being imaged, for example a dye or quantum dot. This analysis shows that nitrogen-vacancy (NV) diamond color centers have potentially the highest resolution. At the same time extremely photostable NVs have been seen in diamond nanocrystals down to a few nanometers in size which makes them less invasive than quantum dots. However, so far the room temperature magnetic sensing capabilities of NV diamond have not been used. In this talk I show how this is critical for achieving the best imaging resolution, and additionally open the possibility of single bio-molecule magnetic resonance imaging using the NV in place of a nuclear magnetic resonance (NMR) pickup coil.

Biography

Hemmer received his B.S. degree in physics from the University of Dayton and his Ph.D. degree in physics from MIT in 1984. From then until 2001, he worked as a physicist at the AFRL at Hanscom, AFB, MA. Since 2002, he has been with the ECE Department at Texas A&M University. Dr Hemmer's current research interests include quantum optics, subwavelength imaging, quantum computing in solids, plasmon-based nano-optics, slow and stopped light, ultrasound imaging. In the past, he has also done research in the areas of fundamental holography, smart pixels, atomic clocks, and laser trapping and cooling.

If you have a question regarding this seminar, please contact Arum Han, arum.han@ece.tamu.edu.

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