

IMS Seminar

Thursday, August 29, 2024

10:30 AM, Science 1 - Room 1002

**Snacks, coffee, and tea will be served beginning at 10:00 a.m.*



Dr. Emre Erdem

Professor of Materials Science and Nano Engineering

Sabanci University

(Hosted by Dr. Steven L. Suib)

Spectroscopic Investigations of Point Defects and Elucidating Their Roles in Supercapacitor Devices

Abstract: Electron paramagnetic resonance (EPR) spectroscopy is a very powerful method due to its enhanced sensitivity to unpaired electrons. In order to understand the defect structure in functional nano-materials we use multi-frequency EPR spectroscopy.

In this presentation i) basics of EPR spectroscopy, ii) quantum confinement effects in ferroelectric nano-materials and iii) EPR and Photoluminescence (PL) investigations of intrinsic defect centers in semiconductor zinc oxide (ZnO) nanoparticles will be given. Starting with the introductory information about EPR spectroscopy; doping and nano-size effects will be discussed for the ferroelectric materials such as, PbTiO₃, BaTiO₃, PbZrTiO₃ (PZT) etc.

In the last part of the talk, surface and core defects and their reactivity under temperature and light will be presented for ZnO semiconductor nano-materials. Defect models will be discussed. Finally application of such materials as electrode materials and their electrochemical performance test results in the supercapacitor devices will be presented.

Biography: Emre Erdem is now full professor at Sabanci University, Materials Science and Nano Engineering program (Istanbul / Turkey). He obtained his BSc degree from Ankara University Physics Department in 1998. In 2001 and 2006, he received his MSc and Ph.D. Degrees from the University of Leipzig Physics Department, respectively. He did postdoctoral research at the Technical University of Darmstadt between the years 2006-2009. In 2010, he became a research group leader in University of Freiburg on the spectroscopic studies of functional nanomaterials and in 2017 he received his habilitation degree in Physical Chemistry. He was awarded LE STUDIUM / Marie Skłodowska-Curie Research Fellowship (2017), Eugen Grätz Prize (2011) and DAAD scholarship (1999). He (co-)authored more than 120 publications in international journals and more than 70 invited talks in conferences.