Department of Electrical and Computer Engineering
Materials Engineering Program
Center for Integrated Bio and Nano Systems
9:00 a.m., May 7, 2021
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Electron Spin Resonance

Alberto Tagliaferro

Department of Applied Science and Technology
Politecnico in Turin (Italy)
OntarioTechU in Oshawa (Canada)

Abstract: In this webinar, we will comprehensively discuss this powerful technique for the investigation of materials. Our journey will start from quantum mechanics and will end discussing ESR applications in a number of different fields such as biology. ESR exploits the Zeeman effect, i.e. the splitting of electronic levels in presence of a magnetic field, coupled with the absorption of microwaves. We will at first describe them and focus on how such mechanisms are exploited in ESR. The parts of the ESR apparatuses and their scopes are discussed next, with a focus on their roles and their limitations. The genesis of the peculiar patterns such as those due to hyperfine splitting will be presented. We will also briefly outline other ESR based techniques such as ENDOR and Spin Echo.

Short Bio: He graduated in Nuclear Engineering and was awarded a PhD in Physics. He is currently associate professor in Solid State Physics at the Department of Applied Science and Technology of Politecnico in Turin (Italy) and adjunct professor at OntarioTechU in Oshawa (Canada). He is Chair of the Education Committee of IUVSTA and member of the editorial board of a number of international journals as well as coeditor of a few books on carbon materials and their applications. He has published more than 190 papers on international journals.

He is head of the research team "Carbon group" of Politecnico (www.polito.it/carbongroup/) that focuses its activity on environmental friendly carbon materials and photocatalytic oxides. Carbon Group is actively working on materials such as biochar, developing new techniques for its analysis as well as testing it in innovative applications. His expertise includes experimental techniques (ESR, XPS, UV-Vis spectroscopy, IR spectroscopy, …) and their data analysis, the most recent achievement being the introduction of the new mixed Gaussian-Lorentzian lineshape in the analysis of

Raman spectra of disordered carbon based materials. His work however includes also application such as sensors, biosensors and composite materials (both polymer-based and cement-based). He also works in collaboration with other research groups worldwide (University of Houston, University of Miami) to investigate nanostructured carbon materials.Bismuth-based oxide are the photocatalytic systems he focused his activity, achieving innovative results in the treatment of polluted water and in sensing of biomolecules and drugs.

Please contact Dr. Francisco Robles Hernandez <fcrobles@Central.UH.EDU> or Jiming Bao (jbao@uh.edu) if you want to meet with the speaker.