

#ICMolTalks

**Dr. Javier
A. Schmidt*****Instituto de Física del Litoral,
Santa Fe, Argentina***

September, 17th - 10:30h

📍 Assembly Hall



■ Abstract

Positron Annihilation Lifetime Spectroscopy Applied to $\text{CH}_3\text{NH}_3\text{PbBr}_3$ Single Crystals

Metal halide perovskite materials have emerged as promising candidates for optoelectronic devices due to their excellent optical and electrical transport properties. In particular, methylammonium lead bromide (MAPbBr_3) is well-suited for tandem solar cells due to its band gap of 2.2 eV, and for light-emitting diodes (LEDs) and lasers due to its emission band in the green region of the spectrum. Defects usually limit the optoelectronic properties of semiconductors, thus an understanding of the chemical nature and activity of those defects is important for developing growing processes that could eventually improve the device performance.

One of the few methods that can directly identify the presence of point defects, and partially their chemical origin, is positron annihilation lifetime spectroscopy (PALS). PALS is routinely used to identify defects in semiconductors. When a positron (e^+) is implanted into condensed matter, it annihilates with an electron emitting two 511 keV gamma-rays. The time difference between the positron implantation and annihilation forms the basis of lifetime spectroscopy. In this talk, the basis of the PALS technique will be reviewed, and the technique will be applied to quantify the vacancy concentration in MAPbBr_3 crystals. Results of ab-initio calculations, which are used to identify the nature of the detected defect, will be presented.

■ Biography

Javier Schmidt received his BSc in Physics in 1993 from the Instituto Balseiro, Bariloche, Argentina, and his PhD in Physics in 1998 from the same institute. He then completed a two-year postdoctoral fellowship at the University of Erlangen, Germany, with a scholarship from the Alexander von Humboldt Foundation. He joined the National Scientific and Technical Research Council (CONICET) of Argentina in 2001, and is currently a Senior Researcher at this organization. He has been teaching since 1995, and is currently a Full Professor at the Faculty of Chemical Engineering, Universidad Nacional del Litoral, where he teaches undergraduate and graduate courses. He is director of the Physics Doctorate Program at the Universidad Nacional del Litoral, and a visiting professor at the Universidad Nacional de Rosario. He is the leader of the Physics of Semiconductors group at the Litoral Physics Institute, Santa Fe, Argentina, and his main research topic is semiconductors with photovoltaic applications.

Invited by

