

## Fédération de Recherche CNRS N°2050 Spectroscopies de Photoémission

Online series of seminar: *join us to learn about*

### **Photoelectron spectroscopy: A powerful tool to probe the sample-environment interaction**

**19<sup>th</sup> of July 2021**

- 9:30 Welcome and introduction
- 9:35 **FR: Spectroscopies de Photoémission: Potential avenues for future actions**  
*Antonio Tejeda – Laboratoire de Physique des Solides, France*
- 9:40 **Emerging Opportunity with Lab-Based Ambient Pressure XPS**  
*Bongjin Simon Mun – Gwangju Institute of Science and Technology, Gwangju, Korea*
- 10:25 **X-ray Spectroscopies go Operando**  
*Marcus Bär- Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Berlin, Germany*
- 11:00 **Coffee Break**
- 11:10 **Discussions on future directions and needs**

## **Emerging Opportunity with Lab-Based Ambient Pressure XPS**

*Bongjin Simon Mun*

*Gwangju Institute of Science and Technology, Gwangju, Korea*

Since its first appearance in 2001, ambient pressure XPS (AP-XPS) unveiled numerous hidden surface phenomena under elevated pressure condition, paving a new pathway in the world of surface science. As focused intense x-ray light source was necessary for successful operation of APXPS, most of APXPS were installed at synchrotron radiation facilities in early days. Then, rapid progresses have been made in the development of laboratory based (lab-based) APXPS system, extending its availability for more general users. Nowadays, there are several industrial companies offering turnkey system of APXPS.

In this presentation, I will present the latest development of lab-based APXPS system around the world. After brief review of basic working principle of ambient pressure XPS, the major advances of lab-based APXPS will be discussed, mostly focusing on micro-focused x-ray source. Within the comparison of experimental conditions and scientific issues, the advantages and challenges of lab-based APXPS will be discussed.

## **X-ray Spectroscopies go *Operando***

*Marcus Bär*

*Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Berlin, Germany*

*Friedrich-Alexander Universität Erlangen-Nürnberg, Erlangen, Germany*

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Routes to insight-driven optimization of optoelectronic devices can be revealed through characterization and fundamental understanding of the chemical and electronic structures of each component in the respective multilayer structure as well as their interaction at the formed interfaces. The combination of complementary electron and x-ray spectroscopic studies has proven to provide crucial insights in that respect. However, in cases where these thoroughly studied and deliberately tailored component and interface properties are changing when put in a device structure or are exposed to operating conditions, this optimization approach fails. Fully exploiting the recent advances in spectroscopic techniques (that used to be exclusively employed in basic research) or their data evaluation and modelling schemes together with smart experiment design and targeted exposure to voltage and/or light bias allows to shed light on these processes.

In the presentation several examples from the field of thin-film photovoltaics will be discussed to showcase the current state of these *operando* analysis developments.