



# **11th Annual Ambient Pressure X-ray Photoelectron Spectroscopy Workshop 2024**

## **Full program**

(Updated on November 30 2024)

**December 3-6 2024  
Sendai, Japan**

## Overview

A workshop on ambient pressure X-ray photoelectron spectroscopy (APXPS) will be held in Sendai, Tohoku, Japan, from 3rd (Tue.) to 6th (Fri.) December 2024. This series of workshops has traditionally been held at synchrotron radiation facilities around the world and continues to be held annually, even during difficult pandemic years when the workshops have changed to a virtual format. The first workshop was held in France (SOLEIL) in 2014, and was held in Taiwan (NSRRC) in 2023. This 11th workshop will take place at NanoTerasu, a newly constructed synchrotron radiation facility in Sendai, Japan. The workshop brings together researchers and students to share and learn about the latest discoveries using APXPS technology in a wide range of research fields, including electrochemistry, interface science, catalysis and materials science. The workshop will include lectures by plenary, invited and contributing speakers, poster sessions, commercial sponsorship sessions and synchrotron visits.

## Sponsors

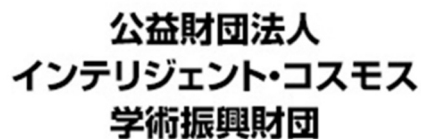
### Financial Supports



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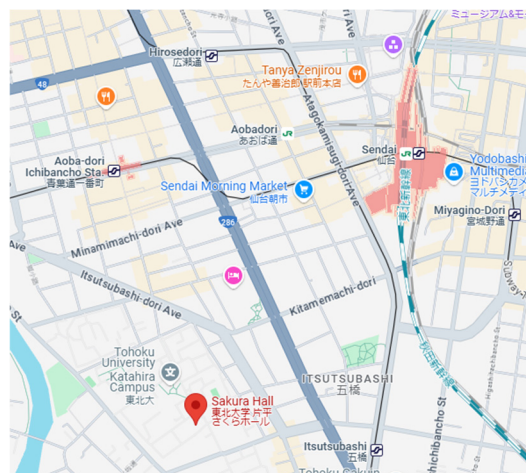


## Venue

### Katahira-Sakura HALL (Oral presentations, Poster session)

2-1-1 Katahira, Aoba-ku, Sendai, Miyagi 980-8577 Japan

<https://sites.google.com/tohoku.ac.jp/sakurahall> (Japanese only)



## Directions from Sendai Station

### By subway:

Take the subway from Sendai Station to Aobadori Ichibancho Station (2 mins). Exit at South 1. Turn left and walk straight ahead for 550 m towards the North Entrance of Katahira Campus.

Take the subway from Sendai Station to Itsutsubashi Station (2 mins). Exit at North 2 or North 4. Turn left and walk straight ahead for 450 m towards the South Entrance of Katahira Campus.

### By bus:

Catch a bus from platform 11 at the west entrance in front of Sendai Station.

bound for the "Miyagi University of Education / Aobadai" or "Dobutsukoen Circle via Aoba-dori" get off at "Aoba dori ichibancho 1-A" Approx. a 5 min ride, 10 min walk from the bus stop

### By foot:

About 15 minutes from the Sendai Station west exit

## Contact

[apxps2024@grp.tohoku.ac.jp](mailto:apxps2024@grp.tohoku.ac.jp)

## **Scientific Advisory Committee**

**Luca Artiglia** (Paul Scherrer Institute, Switzerland)

**Christoph Baeumer** (University of Twente, Netherlands)

**Fabiano Bernardi** (Universidade Federal do Rio Grande do Sul, Brazil)

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**Ira Waluyo** (Brookhaven National Laboratory, USA)

**Chia-Hsin Wang** (NSRRC, Taiwan)

## **Local Organizing Committee**

(Co-chair) **Susumu Yamamoto** (Tohoku University)

(Co-chair) **Iwao Matsuda** (University of Tokyo)

**Tadashi Abukawa** (Tohoku University)

**Masafumi Horio** (University of Tokyo)

**Takanori Koitaya** (Kyoto University)

**Hiroshi Kondoh** (Keio University)

**Yasumasa Takagi** (JASRI/SPring-8)

**Ryo Toyoshima** (University of Tokyo)

**Ryu Yukawa** (Tohoku University)

## Plenary / Invited Speakers

### Plenary

**Serena DeBeer** (Max Planck Institute for Chemical Energy Conversion, Germany)

*From biological to heterogeneous catalysis: Spectroscopic studies of ammonia synthesis and decomposition*

**Yoshitada Morikawa** (Osaka University, Japan)

*Machine learning-enhanced molecular dynamics simulations of surface dynamical processes*

### Invited speakers

**Luca Artiglia** (Paul Scherrer Institute, Switzerland)

*In situ XPS studies of ethylene epoxidation: Learning from model systems to understand powder catalysts*

**Christoph Baeumer** (University of Twente, the Netherlands)

*Complex oxide electrocatalyst surfaces and interfaces*

**Ethan Crumlin** (Lawrence Berkeley National Laboratory, US)

*Probing composite electrochemical interfaces: Challenges and opportunities*

**Julia Kunze-Liebhäuser** (University of Innsbruck, Austria)

*Laboratory based NAP-XPS for probing the electrified solid-liquid interface*

**Bongjin Simon Mun** (Gwangju Inst. of Science & Technology, S. Korea)

*Investigation on surface metal oxide formation on Pt alloys with AP-XPS and AP-STM*

**Nønne Prisle** (University of Oulu, Finland)

*Highly surface-specific chemistry of atmospheric aerosol and droplet models*

**Erik Vesselli** (University of Trieste, Italy)

*Molecular ligation and activation in 2D biomimetic functional materials: From UHV to ambient pressure*

**Susumu Yamamoto** (Tohoku University, Japan)

*APXPS systems at NanoTerasu in Japan: Current status and perspectives*

<b>Plenary Talk</b>	50 min (40 min presentation + 10 min discussion)
<b>Invited Talk</b>	30 min (25 min presentation + 5 min discussion)
<b>Contributed Talk</b>	20 min (15 min presentation + 5 min discussion)

## Time table

	DAY1	DAY2	DAY3	DAY4	
	Dec-3 (Tues)	Dec-4 (Wed)	Dec-5 (Thu)	Dec-6 (Fri)	
8:30					
8:40		Registration	Registration	Registration	
8:50					
9:00					
9:10		Plenary talk 2 : Yoshitada Morikawa	Invited talk 4 : Julia Kunze-Liebhäuser	Invited talk 8 : Nønne Prisle	
9:20					
9:30			J. J. Lin	P. Cong	
9:40					
9:50		A. Shavorskiy	B.-H. Liu	H. Tissot	
10:00	Registration	I. Waluyo	S. Neatu	Break	
10:10					
10:20					
10:30		Break	Break	M. Florea	
10:40					
10:50			F. Garcia-Martinez	M. Jaugstetter	S. Mauri
11:00					
11:10			D. Degerman	G. Held	M. Vorochta
11:20					
11:30			B. Davies	Invited talk 5: Christoph Baeumer	Break
11:40					
11:50		G. Zottis Giroto		Closing	
12:00					
12:10					
12:20					
12:30					
12:40					
12:50					
13:00	Opening	Lunch	Lunch		
13:10					
13:20	Plenary talk 1: Serena DeBeer				
13:30					
13:40					
13:50					
14:00				Invited talk 2: Bongjin Simon Mun	Invited talk 6 : Luca Artiglia
14:10	K. Amemiya				
14:20					
14:30	O. Seo			P. Zeller	F. Neatu
14:40	Break	H.-Y. Huang	H. J. Kim		
14:50					
15:00	H. Zhang	M. A. Andres	D. Wu		
15:10					
15:20	S. Nemsak	Break	Break		
15:30					
15:40	Sponsor session	S. Gholami	A. J. Britton		
15:50					
16:00		S. L. M. Schroeder	T. Koitaya		
16:10					
16:20	Break	Invited talk 3 : Erik Vesselli	Q. Liu		
16:30					
16:40	R. Temperton		Invited talk 7: Ethan Crumlin		
16:50					
17:00	C. Schlueter				
17:10					
17:20	A. Wach	NanoTerasu Visit			
17:30					
17:40	Invited talk 1: Susumu Yamamoto				
17:50					
18:00					
18:10	Break				
18:20					
18:30	Poster			Banquet	
18:40					
18:50					
19:00					
19:10					
19:20					
19:30					
19:40					
19:50			SAC meeting		
20:00					
20:10					
20:20					
20:30					
20:40					
20:50					
21:00					

**DAY 1: December 3 (Tue.), 2024**

10:00 – **Registration**

13:00 – **Opening**

**Session: TECHNICAL INNOVATIONS IN OPERANDO SPECTROSCOPY**

**Session chair: Iwao Matsuda**

13:10 – **Serena DeBeer (Plenary Talk)**

*From biological to heterogeneous catalysis: Spectroscopic studies of ammonia synthesis and decomposition*

14:00 – **Kenta Amemiya**

*Real-time observation of chemical reactions at surface and solid-liquid interface by means of wavelength-dispersive soft X-ray absorption spectroscopy*

14:20 – **Okkyun Seo**

*Introduction of the dip and pull studies using AP-HAXPES at the BL46XU beamline of SPring-8*

14:40 – **Break (20min)**

**Session: TECHNICAL UPDATE SESSION 1**

**Session chair: Hiroshi Kondoh**

15:00 – **Hui Zhang**

*Ambient-pressure mapping of resonant photoemission spectroscopy at BL02B of shanghai synchrotron radiation facility*

15:20 – **Slavomir Nemsak**

*New developments and applications of standing-wave ambient pressure X-ray photoelectron spectroscopy (SWAPPS)*

15:40 – **Sponsor session (40 min)**

**Session chair: Yasumasa Takagi**

16:20 – **Break (20 min)**

**Session: TECHNICAL UPDATE SESSION 2**

**Session chair: Georg Held**

16:40 – **Robert Temperton**

*APXPS developments at the MAX IV laboratory: Present and future*

17:00 – **Christoph Schlueter**

*HAXPES at PETRA III and IV: Electronic structure, operando devices and in-situ catalysis*

17:20 – **Anna Wach**

*Ambient-pressure X-ray photoelectron spectroscopy at SOLARIS: Advancements and future outlook*



17:40 – **Susumu Yamamoto (Invited Talk)**  
*APXPS systems at NanoTerasu in Japan: Current status and Perspectives*

18:10 – **Break (20 min)**

18:30 – **Poster session (90 min)**

## **DAY 2: December 4 (Wed.), 2024**

08:30 – **Registration**

### **Session: IN SITU OBSERVATIONS AT GAS-SOLID INTERFACES 1**

**Session chair: Iwao Matsuda**

09:00 – **Yoshitada Morikawa (Plenary Talk)**  
*Machine learning-enhanced molecular dynamics simulations of surface dynamical processes*

09:50 – **Andrey Shavorskiy**  
*Resolving active and spectator species during the oxidation of carbon monoxide over Pt(111) on the microsecond timescale*

10:10 – **Iradwikanari Waluyo**  
*CO<sub>2</sub> activation and hydrogenation on Pd(111): The role of subsurface hydrogen and defect sites*

10:30 – **Break (20 min)**

### **Session: IN SITU OBSERVATIONS AT GAS-SOLID INTERFACES 2**

**Session chair: Luca Aritiglia**

10:50 – **Fernando Garcia-Martinez**  
*Structure and pressure gap in the NO reduction on Rh studied by ambient-pressure HAXPES*

11:10 – **David Degerman**  
*Selectivity trends in CO hydrogenation over transition metal surfaces*

11:30 – **Bernadette Davies**  
*Probing the carbon monoxide reduction reaction on Cu(111) using operando electrochemical X-ray photoelectron spectroscopy*

11:50 – **Gustavo Zottis Girotto**  
*Evolution of Cu/Ag nanoparticle surface morphology as a catalyst for CO<sub>2</sub> photoreduction*

12:10 – **Lunch (100 min)**

### **Session: IN SITU OBSERVATIONS ON METALS AND ALLOYS**

**Session chair: Slavomir Nemsak**

13:50 – **Bongjin Simon Mun (Invited Talk)**  
*Investigation on surface metal oxide formation on Pt alloys with AP-XPS and AP-STM*

- 14:20 – **Patrick Zeller**  
*Operando investigations of PdAu alloys during selective alkyne hydrogenation*
- 14:40 – **Hsin-Yu Huang**  
*Dehydrogenation of methanol and methane on NiTe<sub>2</sub> surface studied with UHV and NAP photoelectron spectroscopy*
- 15:00 – **Miguel A. Andres**  
*Operando NEXAFS studies of nickel nanoparticles during the oxygen evolution reaction*
- 15:20 – **Break (20 min)**

### Session: IN SITU OBSERVATIONS ON FUNCTIONAL MATERIALS

Session chair: **Iradwikanari Waluyo**

- 15:40 – **Shirin Gholami**  
*Photoelectron angular distributions of ions influenced by surfactants at the ocean-air interface*
- 16:00 – **Sven L. M. Schroeder**  
*Hydrogen bonding of organic solutes in water: A combined NAP XPS, NEXAFS, neutron scattering and DFT analysis of aqueous imidazole and L-histidine*
- 16:20 – **Erik Vesselli (Invited Talk)**  
*Molecular ligation and activation in 2D biomimetic functional materials: From UHV to ambient pressure*
- 17:20 – **NanoTerasu Visit (130 min)**
- 19:00 – **SAC meeting (60 min)**

### DAY 3: December 5 (Thu.), 2024

08:30 – **Registration**

### Session: IN SITU OBSERVATIONS AT LIQUID-SOLID INTERFACES

Session chair: **Sven L M Schroeder**

- 09:00 – **Julia Kunze-Liebhäuser (Invited Talk)**  
*Laboratory based NAP-XPS for probing the electrified solid-liquid interface*
- 09:30 – **Jack J. Lin**  
*APXPS for studying particle-water interactions in the atmosphere*
- 09:50 – **Bo-Hong Liu**  
*In situ XPS Study of single-atom Pt/g-C<sub>3</sub>N<sub>4</sub> as a water splitting photocatalyst*
- 10:10 – **Stefan Neatu**  
*Insights into photocatalytic water splitting on Mo<sub>1.33</sub>C i-MXene/TiO<sub>2</sub> composites: An in situ NAP-XPS study*
- 10:30 – **Break (20 min)**

**Session: IN SITU OBSERVATIONS ON ELECTROCATALYST SURFACES AND INTERFACES**

**Session chair: Erik Vesselli**

- 10:50 – **Maximilian Jaugstetter**  
*Taking a look at the interface: Utilizing APXPS to understand ion behavior in the electric double layer*
- 11:10 – **Georg Held**  
*Operando AP-XPS and NEXAFS studies of oxygen evolution reactions over metal oxide electrocatalysts*
- 11:30 – **Christoph Baeumer (Invited Talk)**  
*Complex oxide electrocatalyst surfaces and interfaces*
- 12:00 – **Lunch (110 min)**

**Session: IN SITU OBSERVATIONS DURING REACTIONS WITH OXYGEN**

**Session chair: Bongjin Simon Mun**

- 13:50 – **Luca Artiglia (Invited Talk)**  
*In situ XPS studies of ethylene epoxidation: Learning from model systems to understand powder catalysts*
- 14:20 – **Florentina Neatu**  
*Mechanistic insights in the selective oxidation of methane on  $\text{CuO}_x$  and  $\text{VO}_x$  supported on MAX phase*
- 14:40 – **Hyuk J. Kim**  
*Enhanced water reaction on oxygen-incorporated transition metal chalcogenide heterostructures*
- 15:00 – **Dongshuang Wu**  
*Revealing the surface structure evolution of commercial Pt nanoparticles during oxygen reduction reaction by electrochemical hard X-ray photoelectron spectroscopy*
- 15:20 – **Break (20 min)**

**Session: IN SITU OBSERVATIONS ON CATALYSTS AND ELECTRODES**

**Session chair: Christoph Baeumer**

- 15:40 – **Andrew J. Britton**  
*In-situ studies of oxygen transport mechanisms in  $\text{Ag/SrFeO}_{3-\delta}$  materials for chemical looping catalysis*
- 16:00 – **Takanori Koitaya**  
*In situ observation of electrochemical  $\text{CO}_2$  reduction at metal electrode- $\text{KHCO}_3$  electrolyte interfaces*
- 16:20 – **Qianhui Liu**  
*Near-interface potential distribution between electrode and electrolyte in Li ion battery with operando APXPS*
- 16:40 – **Ethan Crumlin (Invited Talk)**  
*Probing composite electrochemical interfaces: Challenges and opportunities*

18:00 – **Banquet (120 min)**

**DAY 4: December 6 (Fri.), 2024**

08:30 – **Registration**

**Session: REAL APPLICATIONS IN ENVIRONMENTAL SCIENCE**

**Session chair: Ethan J. Crumlin**

09:00 – **Nønne Prisle (Invited Talk)**

*Highly surface-specific chemistry of atmospheric aerosol and droplet models*

09:30 – **Peixi Cong**

*Mind the gap: In situ XPS/XAS of Co Fischer-Tropsch synthesis at 4 bar*

09:50 – **Heloise Tissot**

*Navigating troubled waters: Radiolysis challenges in NAP-XPS studies of alkali halide aqueous interfaces*

10:10 – **Break (20 min)**

**Session: IN SITU OBSERVATIONS ON METAL OXIDES**

**Session chair: Hui Zhang**

10:30 – **Mihaela Florea**

*Low-temperature selective transformation of methane to formaldehyde over  $VO_x$ /MXene catalysts*

10:50 – **Silvia Mauri**

*Cu doped  $CeO_2$  model catalysts: Understanding the structure-activity relationship on  $CH_4$  activation combining soft X-Ray operando spectroscopies*

11:10 – **Michael Vorochta**

*In-situ characterization of Ru/ $CeO_2$  in oxidizing and reducing environments*

11:30 – **Break**

11:50 – **Closing**

**POSTER session**

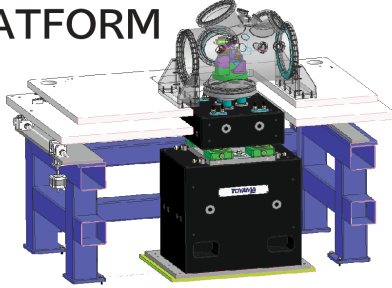
DAY 1: December 3 (Tue.), 2024  
18:30 – 20:00 (90 min)

#	NAME	TITLE
P1	Ibrahima Gueye	Surface Charge Compensation Strategies in Ambient Pressure HAXPES for Analysing Metal Nanoparticles on Oxide Supports
P2	Shucheng Shi	A new lab-based operando XPS method for probing liquid/solid and gas/solid interfaces across a variety of electrochemical systems
P3	Cristiano Kasdorf Giesbrecht	Combining surface analysis techniques under controlled atmosphere conditions? laboratory concept
P4	Sven L. M. Schroeder	Probing Organic Solid/Liquid Interfaces In Situ with Laboratory NAP XPS: Challenges and Opportunities
P5	Mihiro Kubo	Development of near-ambient-pressure low-energy inverse photoelectron spectroscopy to measure unoccupied states under the vapor pressure of water
P6	Mariko Kinoshita	A novel method to evaluate surface electronic state of $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> particles dispersed in aqueous solution: an approach using photoemission yield spectroscopy in air
P7	Slavomir Nemsak	PyXRO? a modern tool for calculating X-ray photoelectron spectroscopy including X-ray optical effects and more
P8	Hariprasad P. Kalappurackal	APXPS setup for the in situ and operando investigation of atomic layer deposition.
P9	Chun-Yu Liu	Measuring Three Dimensional Memory Nanostructures Using X-Ray Critical Dimension Metrology
P10	Satoru Suzuki	Environmental Charge Compensation in Near-Ambient Pressure Photoelectron Spectroscopy Enhanced by Large Sample? Aperture Cone Distance
P11	Lo Yueh Chang	in situ/operando soft X-ray absorption spectroscopy (sXAS) by a flowing liquid cell in TLS/TPS
P12	Mathieu G. Silly	TEMPO beamline: time resolved photoemission spectroscopy from UHV to to near ambient pressure
P13	Anna B. Wach	SOLARIS National Synchrotron Radiation Centre: the infrastructure for science and industry
P14	Ryo Toyoshima	Operando XPS measurements for understanding working principle of metal thin-film gas sensors.
P15	AndrewJ. Britton	Investigating biofilms of live antibiotic resistant bacteria in-situ
P16	Chaimaa Fikry	In-vacuo surface characterisation of functional coating materials with APXPS
P17	Satoshi Yasuno	Characterization of sodium-ion batteries by ambient pressure hard X-ray photoelectron spectroscopy
P18	Beomgyun Jeong	in situ hydration of hygroscopic electrolyte for AP-HAXPES of electrochemical interfaces
P19	Chueh-Cheng Yang	Exploring the species evolution of the IrPt electrocatalysts during OER via APXPS with an electrochemical cell using different polymer membranes
P20	Yasumasa Takagi	Change in electronic state of CaNi <sub>5</sub> during hydrogen absorption and desorption
P21	Haruto Sakurai	Reactions on Boron-Induced Cu(111) Surfaces

P22	Hoon Lim	CO-induced Surface Dynamics and Carbonyl Formation in RhCu(111) Single-Atom Alloys
P23	Dongwoo Kim	A study of CO <sub>2</sub> dissociation properties on Pt <sub>3</sub> Sn(111) surface with Ambient pressure XPS
P24	Yu Murano	CO <sub>2</sub> Activation on a Ni(111) Surface in the Presence of Hydrogen Gas
P25	Subin Jang	Study of CO <sub>2</sub> dissociation on Pt-Ga (111) alloy surface
P26	Hung Shuo Su	Control and CO <sub>2</sub> Capture of Surface Defects of Layered TiTe <sub>2</sub>
P27	Ting-Yun Cheng	Unraveling the Mechanistic Insights into the Electrochemical Reduction of CO <sub>2</sub> to CO on Single Atom Catalysts
P28	Kyungmin Kim	Exploring CO <sub>2</sub> Adsorption Behaviors on the SrTiO <sub>3</sub> (001) Surface with Ambient Pressure XPS
P29	Jiayi Tang	Ambient-pressure XPS study of CO Oxidation on PdRu and PtRu alloy nanoparticles
P30	Ivan Khalakhan	Tracking surface compositional dynamics of Pt-based bimetallic alloys under redox conditions using NAP-XPS
P31	Pardis Simon	FeMo-based catalysts for acrolein production: An in situ X-ray Photoelectron Spectroscopy study
P32	Masaki Nakamura	Formation and characterization of oxygen vacancies in oxide semiconductors using near-ambient-pressure hard X-ray photoelectron spectroscopy
P33	Zong-Jhe Hsieh	The approach of thermal reduction to the water storage capability of graphene oxide membrane
P34	Dooyong Lee	Investigation of Surface Chemical State of SrFeO <sub>2.5</sub> Films during Topotactic Phase Transition with Ambient Pressure X-ray Photoelectron Spectroscopy
P35	Chia-Hsin Wang	Revealing the Reaction Mechanism of Phosphorus-substituted FeCo <sub>2</sub> O <sub>4</sub> Electrocatalysts for Oxygen Evolution Reaction by APXPS
P36	Hyunsuk Shin	Investigations on the origin of topotactic phase transition of LaCoO <sub>3</sub> thin films with in situ XRD and AP-HAXPES
P37	Ryu Yukawa	Ambient Pressure X-ray Photoelectron Spectroscopy Study of Insulator Crystals: La <sub>2</sub> Zr <sub>2</sub> O <sub>7</sub> and La <sub>2</sub> Hf <sub>2</sub> O <sub>7</sub>
P38	Jilong Xu	High-throughput Operando Energy Spectroscopy Beamline

## TOYAMA'S PLATFORM (BASIC TECHNOLOGY)

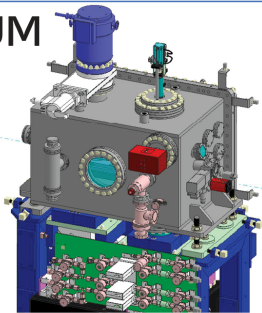
### PLATFORM



**Culmination of technology acquired through the beam line manufacture.**

- High rigidity, Low vibration, Low drift, Low magnetic field
- (Granite bench + Common plate) system
- Chamber on movable platform (SUS316L, Permalloy etc.)

### VACUUM



**Combinations of various vacuum pumps and valves with gas introducers.**

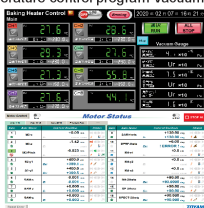
*Ultra-high vacuum ( $10^{-8}$ Pa) ~ Sub-atmospheric pressure ( $10^3$ Pa)*

Example of vacuum pump

- Ion pump
- TSP
- NEG
- TMP
- Dry Back pump etc.

### CONTROLS

Control panel  
Temperature control program Vacuum monitor



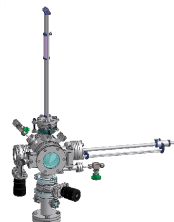
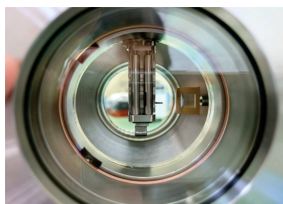
Control rack



**Control panel/Control rack & Software design and production**

- Vacuum Pumping Control & Interlock
- Sample position & Precision system positioning control
- Remote Control & Monitoring
- Control panel & Control rack
- System Control & GUI operation

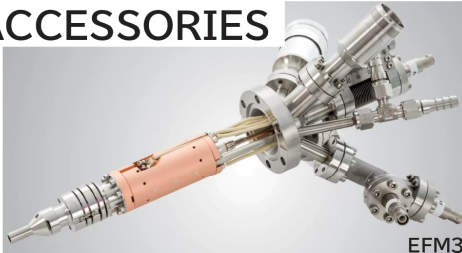
### SAMPLE HANDLING



Storage and Transfer Vessels

- Sample Manipulator (Multi-axis & High rigidity)
- Transporting flag-type sample holders
- Sample manipulation (Piezo, Motor control or manual)
- Sample heating (over  $1000^{\circ}\text{C}$ )
- Sample cooling (Under 30K)
- Sample holder storage
- Sample transfer vessel

### ACCESSORIES



EFM3

- EFM Evaporators (FOCUS GmbH)
- Sputter Ion Gun (FOCUS GmbH)
- MBE Source (MBE-Komponenten GmbH)
- High-performance Ion Gun (IONOPTIKA Ltd.)
- GCIB Ion Gun (IONOPTIKA Ltd.)

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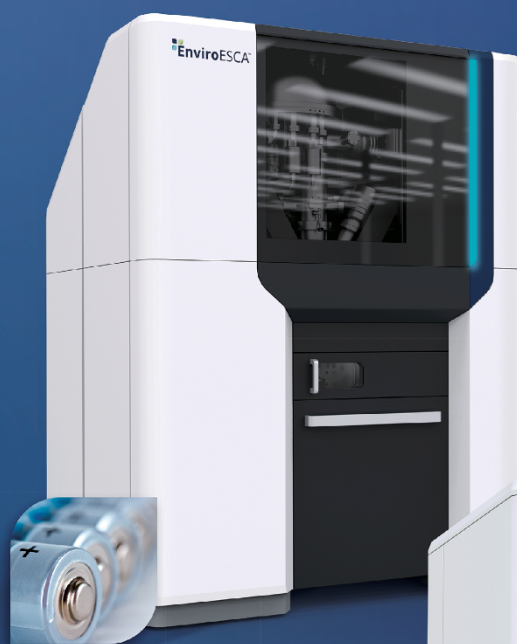
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# EnviroESCA and EnviroMETROS

CHEMICAL ANALYSIS UNDER ENVIRONMENTAL CONDITIONS  
SURFACE HYBRID METROLOGY OF SMALL SAMPLES AND FULL WAFERS

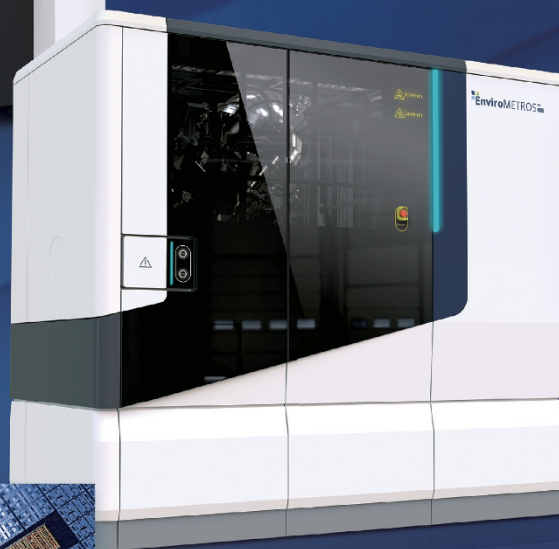
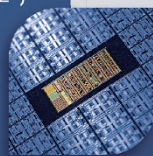


## EnviroESCA

- Rapid quality control using **XPS**
- **High throughput** characterisation
- Operando device analysis in **wet chemical** environment
- Solid, gaseous and liquid samples in a **controllable atmosphere**
- **Glovebox** integration option

## EnviroMETROS

- Fully automated **XPS metrology**
- **Destruction free** nm-layer thickness analysis (ARXPS)
- **Hybrid metrology** (SEM/SAM, LEISS, UPS/IPES, Raman, IRRAS)
- Two versions, two sample sizes LAB (80 × 80mm) or FAB (8"/12")
- **Single wafer** inspection in UHV and NAP condition



SPECS Surface Nano Analysis GmbH [www.specs-group.com](http://www.specs-group.com)

Our Business Partner in Japan  
Tokyo Instruments, Inc. [www.tokyoinst.co.jp](http://www.tokyoinst.co.jp)

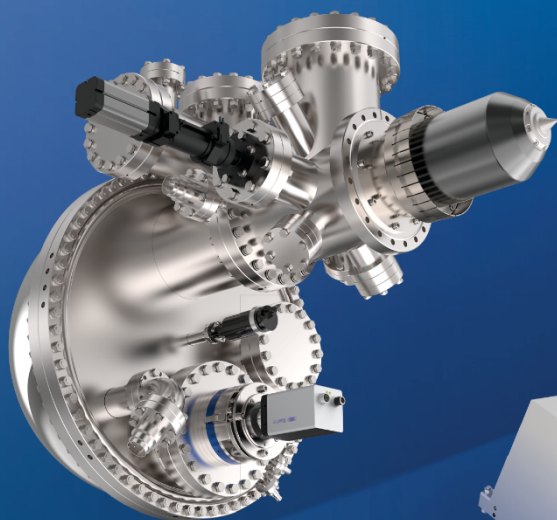
**Enviro**™

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# AEOLOS 150 & $\mu$ FOCUS 450

NEXT GENERATION HEMISPHERICAL ANALYZER AND X-RAY SOURCE  
FOR XPS, NAP-XPS AND HAXPES

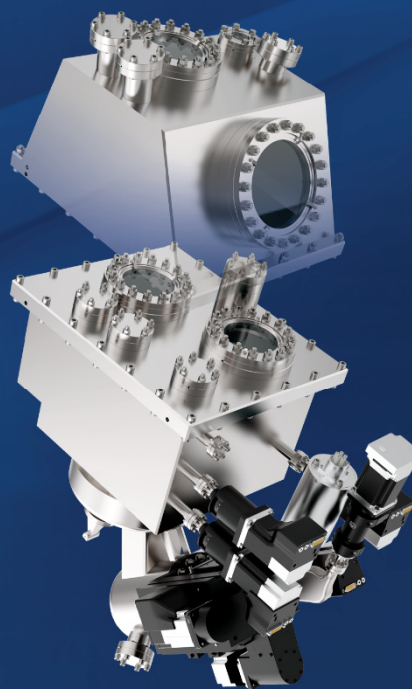


## AEOLOS 150

- Beam forming lens for adaptive transmission enhancement
- Operation up to 10 keV
- 60° wide angle detection
- UHV and NAP operation
- New AD-CMOS true pulse counting detector

## $\mu$ FOCUS 450

- Multiple photon energies at 1487 eV and 2984 eV
- Chromium extension for HAXPES at 5414 eV
- Variable spot size from <math><100 \mu\text{m}</math> to <math>>1000 \mu\text{m}</math>
- Ultimate photon flux densities
- Modular design
- Full software control



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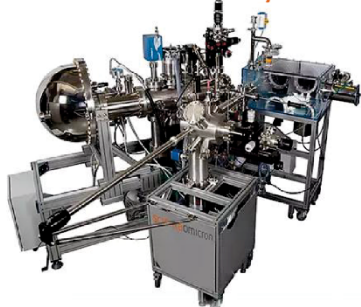
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## Ambient Pressure Photoelectron Spectroscopy

### HiPP Lab

Advanced Measurements Made Easy



- Measure XPS with **several mbar pressure** at the sample
- Robust, flexible and easy to use system ensuring speed to result
- Easy to extend functionality with other modules and with the material innovation platform

### BAR XPS

For Studies of Industrially Relevant Catalytic Reactions



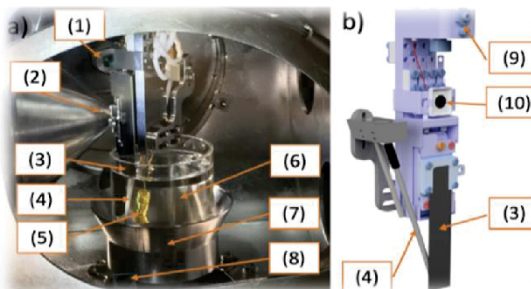
- Study of catalytic reactions
- Measuring XPS under conditions of **> 1 bar** of pressure
- Open-up the possibility of operando studies of heterogeneous catalytic reactions under industrial manufacturing conditions

### HiPP-lab with glove box



Customer installation example

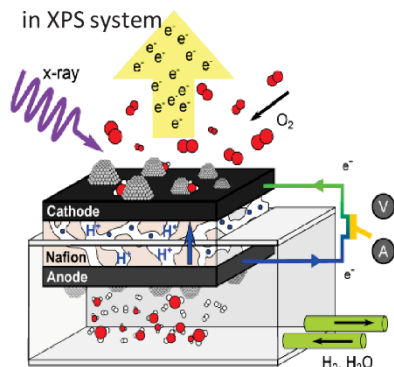
### Electrochemical XPS (Dip & Pull method)



Swiss Light Source: Zbynek et al. Review of Scientific Instruments, 91, 023103 (2020)  
 Advanced Light Source: Axnanda, Sci rep 5(2015) 09788  
 MAX IV Laboratory: Zhu et al Journal of Synchrotron Radiation (2021), 28, 624-636

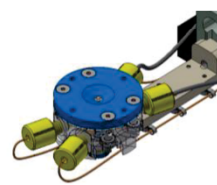
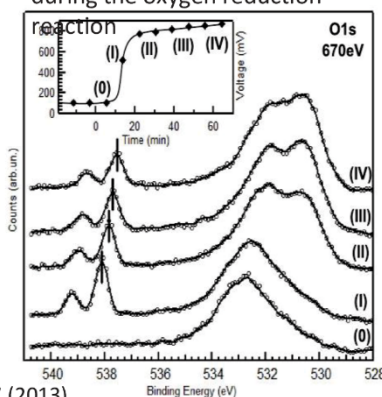
### Application of Electrochemical Cell

Demonstration of electrochemical cell in XPS system



H. S. Casalongue et al. Nature Comm. 4, 2817 (2013)

Probing oxygenated species during the oxygen reduction



3 electrode system



## 製品情報

## 有限会社 テク

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### 1軸/2軸ウォブルスティック

- 1軸ウォブルスティック
- 2軸ウォブルスティック
- 高精度2軸ウォブルスティック

### 1軸/2軸直線回転導入機

- 1軸直線回転導入機
- 2軸直線回転導入機
- 高トルク1軸直線回転導入機

### グリッパー・ピンサー

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### サンプルプレート・サンプルホルダー・サンプルプレートレシーバー

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### サンプルヒーティング

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### サンプルストレージスタック

### 1軸/2軸トランスファーロッド

- モーター駆動
- 1) ストローク: 1250mm
- 2) ピンサー開閉操作

### Boomerax多軸マニピュレーター

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### UHVスーツケース・バッテリー駆動イオンポンプコントローラー

### VAIAN-3keVイオン銃セット

### 2次電子増倍管(CEM)

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有限会社 テク 営業所: 〒178-0063 東京都練馬区東大泉5-43-1-1601  
 TEL: 03-5935-1060 | E-mail: tec.k.matsuda@gmail.com | <https://www.t-e-c.co.jp>



Recommendation

オイルフリーポンプのベストセレクト

**Kashiyama**  
Vacuum Solutions

★ 非接触型ルーツポンプ★

**NeoDry-G**  
シリーズ



高性能、メンテナンス周期：6年など従来の特徴を継承しつつ、更なる低騒音/低振動を実現！

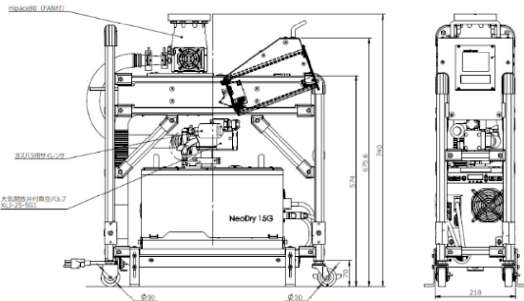
オプション装備を充実させ付加価値を高め、LED表示とモトのスタイリッシュデザインで装いも新たに！！

Invention

**AV-EX80NEO** 小型ターボ排気システム / Neo TURBO Mini

NeoDry-Gシリーズより、15G型を基調とした真空排気システムを考案！

コンパクト且つスリムな設計を重視しつつ、ターボポンプは70L/sクラスに加え、300L/sクラスの搭載も可能。高速でクリーンな真空排気を行うことが可能な小型排気システム。NeoDryからターボポンプ、オプションの真空計まで一括制御可能なコントローラを採用。また停電など突然の有事より高真空側を保護/真空保持出来る様大気開放弁付き緊急遮断電磁式バルブを装備し、安全面にも配慮。ターボポンプはハイブリット構造(上部：磁気軸受け式/下部：セラミックベアリング受け)で、約4年の長寿命サイクルの機体を採用しメンテナンス性も追求。配管や真空計の増設など拡張性も有し、使用環境や用途に応じたフレキシブルな真空排気を提案いたします！！



Neo TURBO Mini  
**AV-EX80NEO**

- ・吸気口：ICF114
- ・ターボ分子ポンプ排気速度：67L/s (N<sub>2</sub>)
- ・粗排気ポンプ排気速度：250L/min
- ・外形寸法：210(W)x520(D)x730(H)
- ・電源電圧：AC100V

お気軽にお問い合わせ下さい！！

株式会社アイリン真空

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