TURKISH SOFT X-RAY PHOTOELECTRON SPECTROSCOPY



Beamline Project @ SESAME





SESAME

UNIVERSITY

KOÇ



Doğram

Biltent Universi

nsan

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XPS X-Ray Photoelectron Spectroscopy

Surface Sensitive (10 nm) : Elemental Analysis Oxidation State Analysis Depth Profiling Thin-film Thickness Analysis Charging Analysis

TXPES



TXPES Beamline PROJECT: Short Description

- Project Objective: Design and Construction of a Soft X-ray Photoelectron Spectroscopy Beam Line at SESAME as a complementary beamline to HESEB
- Project Submission Date: February 2018 Project Approval Date: February 2020
- Project Duration: 36 Months (02/2020 02/2023)
- Project Budget: ₺27 M (TC-SBB)
- Project Coordinator: Turkish Energy Nuclear and Mineral Research Agency (TENMAK) (Former: Turkish Atomic Energy Authority, TAEK)
- Project Partners: Bilkent University, Turkish Accelerator & Radiation Laboratory (TARLA), Koç University

Additional Contributions to the Project: Helmholz Society (Germany), Construction of the X-ray Transport Optics from SR to BL (€3.5 M)



TÜRKİYE CUMHURİYETİ CUMHURBAŞKANLIĞI STRATEJİ VE BÜTÇE BAŞKANLIĞI







Location of **TXPES** in **SESAME**

TXPES (



Complementarity of TXPES & HESEB Beamlines





TXPES Beamline Components





TXPES X-ray Optics Design



TXPES X-ray Optics Design



Also thanks to HESEB team and Rolf Follath



TXPES

XPS End Station

TXPES End Station Design



TXPES End Station Components: Chamber Modules



Two important agreements regarding the TXPES project were officially signed:

- i) Memorandum of Understanding (MoU) document signed between
 SESAME and Turkish Energy Nuclear and Mining Research Agency (TENMAK) which also includes a User Agreement (Annex 1 of MoU)
- ii) Collaboration Agreement Document between TENMAK and Turkish Accelerator and Radiation and Laboratory in Ankara (TARLA) on maintenance and operation of TXPES.



Proposal Submission & Evaluation

- Calls for proposals for the TXPES-BL (beamline) will be coinciding with the regular SESAME call for proposal dates where SESAME will be in charge of routine administrative tasks.
- Proposals will be collected by SESAME using the regular SESAME proposal submission system.
- All of the proposals submitted to *Time Slot III and IV* of TXPES BL will be evaluated by the *Proposal Review Committee* (*PRC*). At least two of the PRC members will be of Turkish nationality.
- Proposals will be ranked based on scientific evaluation scores and will be granted beam-time considering the available user time at TXPES BL.
- Upon evaluation of submitted proposals, PRC will prepare evaluation reports and send its feedback to the relevant principal investigators (PI) via SESAME proposal submission system.



Intellectual Property Ownership:

- Intellectual property (IP) associated with the experiments done by users at SESAME TXPES BL belong entirely to users.
- IP generated as a result of a scientific collaboration between users and beamline scientist BLS (e.g. within activities carried out in *Time Slot III*) will jointly belong to BLS and users whose ownership fractions will be determined by BLS and users upon mutual agreement.



WP1: Human Capacity Building

Human Capacity Building: Staff recruitment

• Beamline scientist (x 1) + Postdoctoral researcher (x1 or x 2)

Human Capacity Building: Staff training in other facilities

• Beamline staff will be trained in other facilities in Europe (BESSY/Elettra or other). Soft x-ray beamlines/XPS systems

Human Capacity Building: Staff training at SESAME

• Beamline staff will help installation of the branchline parts and the endstation



WP4: Control system: Design and development

- Integration of the end station and TXPES branch beamline parts to the XPS End Station
- User friendly interfaces for the XPS measurements
- Coordination with Branch a's control system



WP5: Dissemination and user community build-up

TENMAK TXPES National Workshop (Dec 16, 2021)

- Half-Day Hybrid Event (ZOOM and F2F)
- Talks from XPS Experts, SR Scientists, Potential TXPES Users/Companies.

Summer or winter school on core level spectroscopy, theory and applications

- To continue establishing user community
- To encourage new potential users from academy and industry

Workshop(s): Proposal writing (mostly dedicated to the potential users in Turkey)

- How to write a successful proposal
- Feasibility of the experiments



Do we have operational XPS Systems in Turkey?

Do we have basic technical know-how?





XPS Capabilities @ Ozensoy Lab, Bilkent Univ

XPS-2



TXPES (





Do Industrail Companies Need XPS?

Are they currently utilizing XPS Analyses?



Some of the Companies which are interested in using TXPES

- Some of the leading (among top 100) companies in Turkey were informed about the TXPES project.
- 20 of such companies provided a **«Letter of Intent»** and showed potential interest to use TXPES in industrial R&D when it becomes operational.



Can XPS Studies Improve the Quality and visibility of Academic Publications ?







ACS Publications Most Trusted. Most Cited. Most Read.

TXPES



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Article

Unraveling Molecular Fingerprints of Catalytic Sulfur Poisoning at the Nanometer Scale with Near-Field Infrared Spectroscopy

Zafer Say, Melike Kaya, Çağıl Kaderoğlu, Yusuf Koçak, Kerem Emre Ercan, Abel Tetteh Sika-Nartey, Ahsan Jalal, Ahmet Arda Turk, Christoph Langhammer, Mirali Jahangirzadeh Varjovi, Engin Durgun, and Emrah Ozensoy*

Cite This: J. Am. Chem. Soc. 2022, 144, 8848-8860









pubs.acs.org/acscatalysis

Research Article

Formaldehyde Selectivity in Methanol Partial Oxidation on Silver: Effect of Reactive Oxygen Species, Surface Reconstruction, and **Stability of Intermediates**

Mustafa Karatok, Mehmet Gokhan Sensoy, Evgeny I. Vovk, Hande Ustunel, Daniele Toffoli, and Emrah Ozensoy*











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Chemistry Department, Ankara, Turkey







Contents lists available at ScienceDirect

Applied Catalysis B: Environmental

journal homepage: www.elsevier.com/locate/apcatb



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BUSINESS

SCIENCE MAY 6

This 133-meter accelerator ring in Jordan propels particles—and peace

Flinging around electrons at near the speed of light has had some surprising results at this lab near Amman. One: breaking down political barriers at a time of conflict.



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Read this in Arabic > SESAME's first publication sees light

Published online 20 June 2019

Debut publication from Middle East synchrotron data probes catalytic transformation of glycerol.

Sedeer el-Show

This month sees the publication of the first study¹ based on data collected at the Synchrotron light for Experimental Science and Applications in the Middle East (SESAME) a historical accomplishment for the ambitious and often-troubled multinational particle accelerator. "SESAME is finally a scientific reality bringing opportunity to the scientific community in the Middle East." says Giorgio Paolucci, the facility's scientific director

Originally proposed in 1997 and initiated in 200 SESAME is a cooperative venture between regional governments that otherwise rarely see eve-to-eve including Equpt Iran Israel Jordan Palestine and Turkey amongst its members. The facility based in Allan near Amman Jordan has had to overcome technical challenges, funding gaps, and political





Emrah Ozensoy Bilkent University Chemistry Department, Ankara, Turkey

Exceptionally active and stable catalysts for CO₂ reforming of glycerol to syngas

Selin Bac^a, Zafer Say^{b,c}, Yusuf Kocak^b, Kerem E. Ercan^b, Messaoud Harfouche^d, Emrah Ozensoy^{b,e,**}, Ahmet K. Avci^{a,*}

Department of Chemical Engineering, Bogazici University, Bebek, 34342, Istanbul, Turkey

⁹ Bilkent University, Department of Chemistry, 06800, Ankara, Turkey

Department of Physics, Chalmers University of Technology, 412 96, Göteborg, Sweden

^d Synchrotron-Light for Experimental Science and Applications in the Middle East (SESAME), 19252, Allan, Jordan UNAM-National Nanotechnology Center, Bilkent University, 06800, Ankara, Turkey





www.acsami.org

All-Solution-Processed, Oxidation-Resistant Copper Nanowire Networks for Optoelectronic Applications with Year-Long Stability

Research Article

Sevim Polat Genlik, Dogancan Tigan, Yusuf Kocak, Kerem Emre Ercan, Melih Ogeday Cicek, Sensu Tunca, Serkan Koylan, Sahin Coskun, Emrah Ozensoy, and Husnu Emrah Unalan*

Cite This: ACS Appl. Mater. Interfaces 2020, 12, 45136–45144 Read Online





ACS APPLIED MATERIALS & INTERFACES





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Research Articl

www.acsami.or

Precious Metal-Free LaMnO₃ Perovskite Catalyst with an Optimized Nanostructure for Aerobic C–H Bond Activation Reactions: ACS Applied Materials & Interfaces Alkylarene Oxidation and Naphthol Dimerization

Yesim Sahin, Abel T. Sika-Nartey, Kerem E. Ercan, Yusuf Kocak, Sinem Senol, Emrah Ozensoy,* and Yunus E. Türkmen*



Can I find travel support from Turkish Agencies for SESAME-related activities ?



Travel Support for TXPES-HESEB-SESAME and Other Synchrotron Related Experimental & Educational Activities



TXPES

SR/FEL Facilities within TENMAK Support

Angströmquelle Karlsruhe – ANKA - Germany

BESSY II - Helmholtz-Zentrum Berlin - Germany

Dortmund Electron Storage Ring Facility - Germany

Free Electron Laser at ELBE - Germany

Photon Science DESY (PETRA III, FLASH) – Germany

Metrology Light Source - Germany

ESRF (European Synchrotron Radiation Facility) - France

CLIO (Centre Laser Infrarouge d'Orsay) – France

SOLARIS National Synchrotron Radiation Centre -Poland

DAFNE - Italy

Elettra Synchrotron Light Laboratory - Italy

Diamond Light Source - UK

Max IV Laboratory - Sweden

SLS (Swiss Light Source) - Switzerland

ALBA - Spain

European XFEL - Germany

FELIX Laboratory - Holland

Emrah Ozensoy Bilkent University Chemistry Department, Ankara, Turkey





KOÇ UNIVERSIT Travel Support for TXPES-HESEB-SESAME and Other Synchrotron Related Experimental & Educational Activities



Travel Support Includes:

- Flight Ticket
- Per diem

For each experimental campaign:

• Support up to 4 people (PI, Grad students & Postdocs)

Up to 3 experimental campaigns per year, per P.I.

Up to 15 days of support per campaign.



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Acknowledgements



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