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LUCA SBUELZ

PROFILE

Physicist with a PhD in Condensed Matter Physics obtained at the University of Trieste working at the Nanoscale Materials Laboratory, a joint laboratory between Elettra-Sincrotrone Trieste and the University of Trieste. During my research career I had experiences in various laboratories and was able to adapt and contribute in different fields. I worked on the upgrade and maintenance of the cluster source ENAC, in coordination with the SuperESCA beamline of Elettra, and on the design of the SPHERE-X setup of the INFN in coordination with the INFN workshop of Trieste and the SYRMEP beamline of Elettra. I also contributed in experiments design, to perform them with state-of-the-art equipment, data analysis and interpretation. Most of my research work, performed during my PhD, concerned the production and characterization of sub-nanometers clusters deposited on different substrates (single crystals and 2D materials epitaxial growth and characterized in-situ). I am a quick learner and a hard worker, able to work under pressure and according to deadlines, problem-solving oriented.

WORK EXPERIENCE

Post-Doc (assegno di ricerca)
University of Trieste, IT / 2022 – Present

Activity, co-founded by INFN gr.V and Elettra-Sincrotrone Trieste, aiming to design and implement a setup to perform spectral X-ray imaging (SPHERE-X) and its installation at the SYRMEP beamline of Elettra.

Accomplishments:

- Preliminary design of the system to identify and purchase the materials required for the realization of the setup
 - Coordination with the beamline and INFN staff to define the operating range of the system and the compatibility with the beamline infrastructure
 - Successfully performed a beamtime at the SYRMEP beamline testing a prototype of the SPHERE-X setup employing Spectral imaging and Phase-contrast imaging to study different samples
 - Ongoing goals:
 - Definition of the system design in coordination with the INFN workshop
 - Integrating the SPHERE-X hardware and software with the beamline control
- Design of experiments to characterize the system

EDUCATION

PhD in Condensed Matter Physics
University of Trieste, IT / 2022

Activity performed at the Nanoscale Materials Laboratory, a joint laboratory of Elettra-Sincrotrone Trieste and the University of Trieste. PhD thesis title: "Study of physical properties of mass-selected atomic nanoclusters deposited on solid surfaces".
<https://arts.units.it/handle/11368/3030499>

Accomplishments:

- Contribution to the commission and development of the cluster source ENAC and mechanical and electronic components
- Maintenance, operations and upgrades on Ultra High Vacuum systems, alignment and maintenance of a class 4 Nd:YAG laser
- Upgrade of the acquisition software
- Planning and coordinating the transport and installation of ENAC at the SuperESCA beamline of Elettra
- Production and characterization of exactly mass-selected clusters of different materials with sub-nanoscale size
- Successfully performed experiment connecting ENAC with the SuperESCA beamline as user and as support for external users
- Epitaxial growth and characterization of 2D materials (Graphene and MoS₂) as substrates candidates for clusters deposition

MSc Condensed Matter Physics 103/110
University of Trieste, IT / 2018

- Master's thesis in condensed matter Physics:
"Characterization of a mass-selected atomic cluster source"
<https://thesis.units.it/handle/20.500.12072/86745>

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SCHOOLS, WORKSHOPS AND CONFERENCES

- Virtual DPG Spring Meeting SurfaceScience 2021, online
- Bilateral Workshop nanotechnology and nanoapplication, 2020, Ljubljana. Presented the poster: "ENAC: a source to generate atomically precise size-selected nanoclusters"
- XV School on Synchrotron Radiation "Synchrotron Radiation: Fundamentals, Methods and Applications", 2019, Trieste. Presented the poster: "ENAC: the new source of size-selected nanoclusters"
- EWinS 2016 – EUSpec Winter School on core level spectroscopies, 2016, Ajdovščina

TECHNICAL SKILLS

- Microsoft Office package
- LabVIEW, Fortran, Python
- Wavemetrics Igor Pro
- X-ray Photoelectron Spectroscopy, X-ray Photoelectron Diffraction, Time resolved - Angle Resolved PhotoEmission Spectroscopy, Low Electron Energy Diffraction, Spectral imaging, Phase-contrast imaging
- Chemical Vapour Deposition used to grow 2D materials (graphene and MoS₂) and carbon nanotubes

SOFT SKILLS

- Problem Solving
- Teamwork
- Leadership
- Data presentation
- Efficient planning
- Scientific divulgation

SCIENTIFIC DIVULGATION

- Guide during visits to Elettra Sincrotrone Trieste for High school students (March 1st, March 22nd, April 13th, April 19th, May 19th, May 25th 2023)
- Maker Faire Trieste 2020, external collaborator for the association Science Industries "Science Industries' Water Rockets Platform"
- Maker Faire Trieste 2019, external collaborator for the association Science Industries "Tra 10 secondi, svolta a destra!"
- Maker Faire Trieste 2017, external collaborator for the association Science Industries "Science Industries' Water Rocket Contest"

LANGUAGES

- Italian – Native
- English – Proficient (B2)

PUBLICATIONS IN PEER- REVIEWED JOURNALS

1. "The highest oxidation state observed in graphene-supported sub-nanometer iron oxide clusters"
D. Perco, F. Loi, L. Bignardi, L. Sbuelz, P. Lacovig, E. Tosi, S. Lizzit, A. Kartouzian, U. Heiz, and A. Baraldi
Commun Chem 2023 6, 61
<https://doi.org/10.1038/s42004-023-00865-x>
2. "Breakdown of the correlation between oxidation states and core electron binding energies at the sub-nanoscale"
F. Loi, M. Pozzo, L. Sbuelz, L. Bignardi, P. Lacovig, E. Tosi, S. Lizzit, A. Kartouzian, U. Heiz, R. Larciprete, D. Alfé, and A. Baraldi
Appl. Surf. Sci., 2023, 619
<https://doi.org/10.1016/j.apsusc.2023.156755>
3. "Oxidation at the sub-nanoscale: oxygen adsorption on graphene-supported size-selected Ag clusters."
F. Loi, M. Pozzo, L. Sbuelz, L. Bignardi, P. Lacovig, E. Tosi, S. Lizzit, A. Kartouzian, U. Heiz, D. Alfé, and A. Baraldi
J. Mater. Chem. A, 2022, 10
<https://doi.org/10.1039/D2TA02539F>
4. "Atomic Undercoordination in Ag Islands on Ru(0001) Grown via Size-Selected Cluster Deposition: An Experimental and Theoretical High-Resolution Core-Level Photoemission Study"
L. Sbuelz, F. Loi, M. Pozzo, L. Bignardi, E. Nicolini, P. Lacovig, E. Tosi, S. Lizzit, A. Kartouzian, U. Heiz, D. Alfé, and A. Baraldi
J. Phys. Chem. C, 2021, 125, 17
<https://doi.org/10.1021/acs.jpcc.1c02327>
5. "Unusual reversibility in molecular break-up of PAHs: the case of pentacene dehydrogenation on Ir(111)"
D. Curcio, E. Sierda, M. Pozzo, L. Bignardi, L. Sbuelz, P. Lacovig, S. Lizzit, D. Alfé and A. Baraldi
Chem. Sci., 2021, 12
<https://doi.org/10.1039/D0SC03734F>
6. "Growth Mechanism and Thermal Stability of a MoS₂-Graphene Interface: A High-Resolution Core-Level Photoelectron Spectroscopy Study"
F. Loi, L. Sbuelz, P. Lacovig, D. Lizzit, L. Bignardi, S. Lizzit, and A. Baraldi
J. Phys. Chem. C, 2020, 124, 38
<https://doi.org/10.1021/acs.jpcc.0c05037>
7. "Bulk diffusive relaxation mechanisms in optically excited topological insulators"
A. Sterzi, G. Manzoni, L. Sbuelz, F. Cilento, M. Zacchigna, Ph. Bugnon, A. Magrez, H. Berger, A. Crepaldi, and F. Parmigiani
Phys. Rev. B, 2017, 95
<https://doi.org/10.1103/PhysRevB.95.115431>
8. "Recognizing Physisorption and Chemisorption in Carbon Nanotubes Gas Sensors by Double Exponential Fitting of the Response"
A. Calvi, A. Ferrari, L. Sbuelz, A. Goldoni, and S. Modesti
Sensors, 2016, 16(5)
<https://doi.org/10.3390/s16050731>

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BEAMTIMES

As a member of the research group at Elettra

- Federico Loi 20215598; "Reactivity of size-selected Mo clusters below the nanometer scale"
- Luca Bignardi 20215116; "Reactivity of sub-nanometer carbon clusters and their role in polycyclic aromatic hydrocarbons formation"
- Luca Bignardi 20210345; "Elementary reactivity of sub-nanometer atomically precise Fe clusters"
- Luca Bignardi 20205098; "Oxidation of sub-nanometer atomically-precise Pt clusters"
- Alessandro Baraldi 20200300; "A new opportunity for the SuperESCA beamline: physical, catalytic and astrochemical properties of size-selected nanoclusters." (Long term, 2 years)
- Alessandro Baraldi 20195310; "Structure and electronic structure of graphene-supported size-selected Ag nanoclusters"

As support for external users at Elettra

- Aras Kartouzian 20220085; "Methane activation by size-selected supported Ta clusters"
- Rosanna Larciprete 20205449; "H₂ dissociation at the Gr/Ni(111) interface mediated by size selected Pt clusters."

OTHER INFORMATIONS

- Birth date:
- Nationality:
- European Driving license B

Autorizzo il trattamento dei miei dati personali ai sensi del Decreto Legislativo 30 giugno 2003, n. 196

"Codice in materia di protezione dei dati personali" e s.m.i, e del Regolamento UE 2016/679 (GDPR)

Dichiaro di essere consapevole delle conseguenze connesse ad eventuali false dichiarazioni ai sensi

dell'art. 76 del D.P.R. 28 dicembre 2000, n. 445

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