

Dr. Axel WILSON

Chargé de recherche CNRS
Laboratoire de Réactivité de Surface
Sorbonne-Université & CNRS, UMR 7197
4 place Jussieu, 75005 Paris
+33 1 44 27 30 50
axel.wilson@sorbonne-universite.fr

Curriculum Vitae

1. Personal Information

Axel WILSON, tenured researcher, Ph.D.
Date of birth: 15/07/1986
Nationality: French

2. Education

09/2011 – 11/2014	Ph.D. in Physics, University Pierre and Marie Curie, Institut des NanoScience de Paris, Paris, France and Synchrotron SOLEIL, SIXS SXR beamline, St Aubin, France <i>“Au-Cu nanoparticle growth on TiO₂(110) followed by STM and SXR: from nucleation to behaviour under reactive environment”</i>
09/2009 – 08/2011	Master in physics, Material Science and NanoObjects, University Pierre and Marie Curie, Paris, France
09/2008 – 08/2009	Bachelor in physics, University Pierre and Marie Curie, Paris, France
09/2006 – 08/2008	DUT (two-year university degree in technology) in physics, Orsay’s university institute of technology, Orsay, France
09/2005 – 08/2006	Math-SUP (undergraduate courses to prepare nationwide competitive exams in sciences), Lycée Raspail, Paris, France
07/2006	Baccalauréat (French secondary school diploma), Industrial & Technology Sciences major

3. Research experience

Novembre 2019 – present	Tenured researcher, Laboratoire de Réactivité de Surface – UMR 7197, Sorbonne-Université / CNRS
-------------------------	---

“Exploration of oxide hybrid structures for hydrogen production”

I have been awarded a Rutherford International Fellowship to investigate using SXR, XPS and STM the structural evolution of SrTiO₃ based materials in photo-electrochemical conditions. This project includes the final development of the photoelectron-chemical cell for SXR, the day-to-day supervision of two PhD students and the continuation of my collaborations.

July 2016 – July 2019	Marie Skłodowska Curie Fellowship, Science Division, Diamond Light Source Ltd.
-----------------------	--

“Exploration of oxide hybrid structures for hydrogen production”

I have been awarded a Rutherford International Fellowship to investigate using SXR, XPS and STM the structural evolution of SrTiO₃ based materials in photo-electrochemical conditions. This project includes the final development of the photoelectron-chemical cell for SXR, the day-to-day supervision of two PhD students and the continuation of my collaborations.

February 2015 – July 2016 Postdoctoral position, Thornton's group, Department of Chemistry, University College London

"Research associate in synchrotron radiation and surface science"

My work, in collaboration with Diamond Light Source (Oxfordshire, UK), consists in managing and supervising experiments carried out with synchrotron radiation at DLS, ESRF and SOLEIL by the Thornton group (UCL). It includes part of the conception of the photoelectron-chemical cell for SXRD involved in this project. In addition, I am in charge of experiences and experimental devices in the surface laboratory of the chemistry department of UCL and the day-to-day supervision of three PhD students.

4. Techniques & Transferable Skills

Laboratory techniques:

Variable Temperature Scanning Tunneling Microscopy, (Spot Profile Analysis of) Low Energy Electron Diffraction, Auger Electron Spectroscopy, X-ray Photoemission Spectroscopy, Ultra High Vacuum

Synchrotron techniques:

Surface X-Ray Diffraction, X-ray Photoemission Spectroscopy, X-ray Absorption Spectroscopy, X-ray PhotoElectron Emission Microscopy, X-ray Standing Wave

Programming languages:

Python for instrumentation, instrument control and data analysis

5. Publications

◇ Published

– 2021 –

Studying the onset of galvanic steel corrosion in situ using thin films: film preparation, characterization and application to pitting

D. Garai, V. Solokha, A. Wilson, I. Carlomagno, A. Gupta, M Gupta, V R Reddy, C. Meneghini, F. Carla, C. Morawe and J. Zegenhagen
J. Phys.: Condens. Matter, **33**, (2021), 125001

– 2020 –

Swelling of Steel Film by Hydrogen Absorption at Cathodic Potential in Electrolyte

D. Garai, I. Carlomagno, V. Solokha, A. Wilson, C. Meneghini, C. Morawe, V. Murzin, A. Gupta, J. Zegenhagen
Phys. Status Solidi B, **257**, (2020)

Photoemission core level binding energies from multiple sized nanoparticles on the same support: TiO₂(110)/Au

A. Mellor, A. Wilson, C. L. Pang, C. M. Yim, F. Maccherozzi, S. S. Dhesi, C. A. Muryn, H. Idriss, and G. Thornton
J. Chem. Phys., **152**, (2020), 024709

– 2019 –

Water Splitting on Ti-Oxide-Terminated SrTiO₃(001)

V. Solokha, D. Garai, A. Wilson, D. A. Duncan, P. K. Thakur, K. Hingerl and J. Zegenhagen
J. Phys. Chem. C, **123**, (2019), 17232–17238

Gas-induced selective re-orientation of Au–Cu nanoparticles on TiO₂ (110)

A. Wilson, A. Bailly, R. Bernard, Y. Borensztein, A. Coati, B. Croset, H. Cruguel, A. Naitabdi, M. Silly, M-C. Saint-Lager, A. Vlad, N. Witkowski, Y. Garreau, and G. Prevot
Nanoscale, **11**, (2019), 752–761

– 2018 –

Mean escape depth of keV photoelectrons in silicon measured by transmission through thin membranes

V. Solokha, T-L. Lee, A. Wilson, K. Hingerl, and J. Zegenhagen
J. Electron Spectrosc. Relat. Phenom. **225**, (2018), 28–35

Water Dissociates at the Aqueous Interface with Reduced Anatase TiO₂ (101)

I. M. Nadeem, J. P. W. Treacy, S. Selcuk, X. Torrelles, H. Hussain, A. Wilson, D. C. Grinter, G. Cabailh, O. Bikondoa, C. Nicklin, A. Selloni, J. Zegenhagen, R. Lindsay, and G. Thornton
J. Phys. Chem. Lett., **9**, (2018), 3131–3136

Bridging Hydroxyls on Anatase TiO₂ (101) by Water Dissociation in Oxygen Vacancies

I. M. Nadeem, G. T. Harrison, A. Wilson, C-L. Pang, J. Zegenhagen, and G. Thornton
J. Phys. Chem. B, **122**, (2018), 834–839

– 2017 –

Mechanism of Ethanol Photooxidation on Single-Crystal Anatase TiO₂ (101)

K. Katsiev, G. Harrison, H. Alghamdi, Y. Alsalik, A. Wilson, G. Thornton, and H. Idriss
J. Phys. Chem. C, **121**, (2017), 2940–2950

– 2016 –

Promoter effect of hydration on the nucleation of nanoparticles: direct observation for gold and copper on rutile TiO₂ (110)

M. Iachella, A. Wilson, A. Naitabdi, R. Bernard, G. Prevot, and D. Loffreda
Nanoscale, **8**, (2016), 16475–16485

– 2015 –

Critical Au Concentration for the Stabilization of Au-Cu Nanoparticles on Rutile against Dissociation under Oxygen

A. Wilson, R. Bernard, Y. Borensztein, B. Croset, H. Cruguel, A. Vlad, A. Coati, Y. Garreau, and G. Prevot
J. Phys. Chem. Lett., **6**, (2015), 2050–2055

– 2014 –

Epitaxial growth of bimetallic Au-Cu nanoparticles on TiO₂ (110) followed in situ by scanning tunneling microscopy and grazing-incidence x-ray diffraction

A. Wilson, R. Bernard, A. Vlad, Y. Borensztein, A. Coati, B. Croset, Y. Garreau, and G. Prevot
Phys. Rev. B, **90**, (2014), 075416

– 2013 –

Growth of Si ultrathin films on silver surfaces: Evidence of an Ag (110) reconstruction induced by Si

R. Bernard, T. Leoni, A. Wilson, T. Lelaidier, H. Sahaf, E. Moyen, L. Assaud, L. Santinacci, F. Leroy, F. Cheynis, A. Ranguis, H. Jamgotchian, C. Becker, Y. Borensztein, M. Hanbücken, G. Prévot, and L. Masson
Phys. Rev. B, **88**, (2013), 121411

◇ **Submitted**

Surface structure of stainless steel and steel thin films with applications to corrosion

Debi Garai, Axel Wilson, Ilaria Carlomagno, Carlo Meneghini, Francesco Carla1, Hadeel Hussain, Ajay Gupta, Jörg Zegenhagen
Submitted to *Phys. Status Solidi B*

◇ **In preparation**

Surface Characterisation of Organic Crystals in a Humid Environment

S.-Y. Chang, B. Taylor-Barrett, E. A. Willneff, H. Hussain, A. Wilson, V. Pérez-Dieste, C. Escudero, A. B. Kroner, E. J. Shotton, and S. L. M. Schroeder
In preparation for *Langmuir*

Photo-Electrochemical Droplet Cell for Interfacial Nanoscience

A. Wilson, I. M. Nadeem, H. Hussain, X. Torrelles, G. Thornton, C. Nicklin, and J. Zegenhagen
In preparation for *Review of Scientific Instruments*

Biom mineralization in barnacle base plate in association with adhesive cement protein

Sunyoung Hur, Axel Wilson, Christophe Méthivier, Souhir Boujday, Ali Miserez
In preparation for *J. Phys. Chem. C*

Growth, oxidation and re-nucleation of Cu nanoparticles on TiO₂(110)

Axel Wilson, Romain Bernard, Alina Vlad, Hervé Crugel, Yves borensztein, Alessandro Coati, Bernard Croset, Yves Garreau, Geoffroy Prévot
In preparation for *Phys. Rev. B*

6. Oral communications

Invited seminars:

2013 – ENS Lyon (Lyon, France)

2014 – Berkeley National Lab (California, USA)

Research group meeting:

- 2012 – Tailor (Grenoble, France)
- 2013 – Nanoalliages (Orléans, France)
- 2013 – C(RS)2 (Lilles, France)
- 2014 – SUM 2014 (St-Aubin, France)
- 2016 – Royal Chemical Society Meeting 2016 (London, United Kingdom)

International conferences:

- 2012 – ICN+T (Paris, France)
- 2014 – ICN+T 2014 (Vail, Colorado, USA)
- 2016 – X-Ray Microscopy Conference 2016 (Oxford, UK)
- 2018 – APS March Meeting Los Angeles (California, USA)
- 2019 – OPSCAT Operando Surface Catalysis meeting (Oslo, Norway)

7. Supervision of graduate students

- 2021 – 2024 Walid Ait-Mammer – Laboratoire de Réactivité de Surface
“3D design of a microfluidic cell for the rapid bio-detection of pathogen targets”
- 2016 – 2018 Vlad Solokha – Diamond Light Source
“Spectroscopy of the solid/liquid electrified interface toward harvesting solar energy”
- 2016 – 2018 Debi Garai – Diamond Light Source
“Studying the early stages of the galvanic corrosion of steel controlled by electrochemical potential”
- 2014 – 2018 Immad Nadeem – UCL London Centre for Nanotechnology
“Photo-electrochemistry of light harvesting metal oxide surfaces: TiO₂ and SrTiO₃”
- 2013 – 2017 George Harrison – UCL London Centre for Nanotechnology
“Surface science investigation of mixed-phase rutile and anatase TiO₂”
- 2012 – 2016 Andrew Mellor – UCL Department of Chemistry
“Noble metal enhancement of solar hydrogen generation over CeO₂”

8. Teaching activity

- 2014 – 2015 Teacher assistant, tutor “Basics concepts of thermodynamics” (Bachelor 1 - UPMC)
- 2013 – 2014 Teacher assistant “Solid dynamics” (Bachelor 1 - UPMC)
- 2006 – 2011 Private lessons to groups of 4 middle and high school students in math, physics and chemistry

9. Miscellaneous

- 2012 – Scientific mediator for the Cultural division of University Pierre and Marie Curie in a project including the realisation of a documentary and an exhibition about a Van DeGraff generator
“Safeguard project of the 3 MeV particle accelerator of the Paris Institute of NanoScience”
- 2013 – HERCULES international advanced school participant (6 weeks):
“Higher European Research Course for Users of Large Experimental Systems”
- Language: French (native speaker)
English (fluent)