

Vijayalakshmi Kalyanaraman, PhD

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Summary

Surface scientist with extensive knowledge and skills acquired over 6 years and specialization in **x-ray photoelectron spectroscopy (XPS)**

Skills

Technical: XPS, resonant Auger, XEOL, PVD, XES, TEM, LEED, ToF-MS, STM, thin film deposition and building UHV equipments

Computer: Basic knowledge of Linux, fundamental programming in Fortran 90

Language: Good speaking and reading German

Experience

Mobius Art and Science Initiative (MASI), Chicago, IL

Development Manager (volunteer position), February 2011 – Present

- Co-founder of MASI
- To develop strategies to bring awareness of scientific research and technology to the general public
- To research on topics at the intersection of Science and Art and provide suitable materials for blogs
- To communicate scientific research to the general public through blogs

Argonne National Laboratory, Lemont, IL

Postdoctoral Research Scientist, January 2009 – November 2010

Project: Astrochemistry from surface science perspective

- Conducted studies on x-ray induced reaction of adsorbed L-alanine on a magnetic substrate in order to understand the chiral dependence in interaction of spin polarized secondary electrons with chiral adsorbate molecules using XPS
- Carried out preliminary studies of x-ray induced surface chemistry reaction patterns of adsorbed butanol using time of flight mass spectrometry (**TOF-MS**)
- Collaborated with staff at Center for Nanoscale Materials to study electron induced chemistry of adsorbed L-alanine using scanning tunneling microscopy (**STM**)
- Conducted studies on the optical properties of deposited films of coronene to understand the radiation damage using x-ray excited optical luminescence (**XEOL**) spectroscopy and **XPS**
- Investigated with XEOL the deposited nanostructured oxide materials to understand electronic structure and defect densities
- Wrote a successful **beam time proposal** and utilized soft x-ray beam line at Argonne National Laboratory of Advanced Photon Source (**APS**)
- Assembled sample manipulator for surface science studies and built excellently working dual source organic evaporator
- Prepared **metal/alloy thin films** by sputter deposition (and **QCM**); deposited **organic molecules** on the metal/alloy/semiconductor surfaces by physical vapor deposition (**PVD**)

CV of Dr. VIJAYALAKSHMI KALYANARAMAN

- Utilized low energy electron diffraction (**LEED**) to characterize single crystals
- Presented research results at international conferences

Nanoscale Physics Group, University of Illinois, Chicago, IL

Visiting scholar, August 2008 – December 2008

- Prepared cross sectional Si and LaCoO₃ thin film samples to study grain boundaries using Transmission Electron Microscopy (**TEM**)
- Obtained 10 hours of training to operate/use TEM

University of Hamburg, Germany

Research Assistant, December 2006

- Measured and analyzed near edge x-ray absorption fine structure (**NEXAFS**) spectra, synchrotron XPS and **resonant autoionization** of atomic and molecular adsorbates
- Successfully analyzed Resonant Raman spectrum of spectroscopically complex molecule, C₆F₆, for charge transfer times
- Collaborated with the research group for **time-resolved two-photon photoemission** experiment on C₆F₆/Cu(111) and showed fundamental differences between **core-hole-clock spectroscopy** and time resolved two photon photoemission techniques
- Conducted successful experiments at the soft x-ray beam line at **HASYLAB** of Hamburg (Germany), at **BESSY** of Berlin (Germany) and at **MAXLAB** of Lund (Sweden)
- Prepared metal/semiconductor surfaces for surface science experiments
- Prepared metal thin films by e-beam evaporation
- Calibrated soft x-ray Emission Spectrometer with soft x-ray synchrotron and electron gun
- Wrote **2 peer-reviewed** publications and ranked as **corresponding author** for the third article

Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore, India

Research Scholar (April 2000 – April 2002)

- Investigated hydrogen bonding strength in co-adsorbed methanol-water and surface chemical reactions in co-adsorbed CS₂-O₂ on single crystal metal surfaces
- Maintained ultra vacuum chambers and operated ESCALAB 3 for XPS measurements
- Presented research results at international conferences and **wrote two manuscripts** for publication in peer-reviewed journals

Education

University of Illinois at Urbana-Champaign, Illinois

Certification in Community College Teaching and Learning, April 2011-Present

University of Hamburg, Germany

PhD, in Condensed Matter Physics, December 2006

- **Thesis:** Core-hole-clock spectroscopy: Characterization of the method and dynamics of charge transfer at adsorbate metal interfaces
- **Published online:** <https://www.sub.uni-hamburg.de/opus/volltexte/2007/3340/>

CV of Dr. VIJAYALAKSHMI KALYANARAMAN

Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)/Manipal Academy of Higher Education (MAHE), Bangalore, India

M.S (in Chemical Sciences), April 2002

- **Thesis:** Co-adsorption of gases on metal surfaces: Investigations using X-ray Photoelectron Spectroscopy

Awards/Professional Affiliations

- Recipient of research scholarship for Masters education (1999-2002)
- American Vacuum Society (**AVS**) - 2010
- Association for Woman in Science (**AWIS**) – 2010-present

Publications

1. X-ray induced strand breaks in self assembled monolayer of DNA on gold

K. Vijayalakshmi and R. A. Rosenberg, **manuscript in preparation**

2. Luminescence quenching in coronene thin films by x-ray induced defects

K. Vijayalakshmi and R. A. Rosenberg, **manuscript in preparation for APJ**

3. Depth resolved luminescence from oriented ZnO nanowires R.A. Rosenberg, M. Abu Haija, K. Vijayalakshmi, J. Zhou, S. Xu and Z.L. Wang, **App. Phys. Lett.** 95 (2009) 243101

4. Charge transfer dynamics in molecular solids and adsorbates driven by local and non-local excitations A. Föhlisch, S. Vijayalakshmi*, A. Pietzsch, M. Nagasono, W. Wurth and P. S. Kirchmann, P.A. Loukakos, U. Bovensiepen, M. Wolf, M. Tchapyguine, F. Hennies, **under review for Surface Science**

5. Interface photovoltage dynamics at the buried BaF₂/Si interface: Time resolved laser-pump/synchrotron-probe photoemission A. Pietzsch, A. Föhlisch, F. Hennies, S. Vijayalakshmi, W. Wurth, **Appl. Phys. A** 88, 587 (2007)

6. Verification of the core-hole-clock method using two different time references: Attosecond charge transfer in c(4x2)S/Ru(0001) A. Föhlisch, S. Vijayalakshmi, F. Hennies, W. Wurth and V. R. Medicherla and W. Drube, **Chem. Phys. Lett.** 434 (2007) 214

7. Ultrafast Electron Dynamics in C₆F₆/Cu(111) after a Localized or Delocalized Excitation

P. S. Kirchmann, P. A. Loukakos, U. Bovensiepen, and M. Wolf, S. Vijayalakshmi, F. Hennies, A. Pietzsch, M. Nagasono, A. Föhlisch, and W. Wurth.. **Ultrafast Phenomena XV**, Eds. R.D.J. Miller and A. Weiner, Springer (2006)

8. Bond polarization and image-potential screening in adsorbed C₆F₆ on Cu(111)

S. Vijayalakshmi, A. Föhlisch, P. S. Kirchmann, F. Hennies, A. Pietzsch, M. Nagasono, W. Wurth, **Surf. Sci.** 600 (2006) 4972

9. Surface projected electronic band structure and adsorbate charge transfer dynamics: Ar adsorbed on Cu(111) and Cu(100) S. Vijayalakshmi, A. Föhlisch, F. Hennies, A. Pietzsch, M. Nagasono, W. Wurth and A. G. Borisov and J. P. Gauyacq, **Chem. Phys. Lett.** 427 (2006) 91

10. A hydrogen bonded methanol-water complex on Zn(0001) Surface

S. Vijayalakshmi, C. P. Vinod, G. U. Kulkarni, **Surf. Rev. Lett.** 10 (2003) 87

11. Interaction between carbon disulfide and oxygen on a Ni(110) surface

S. Vijayalakshmi, G. U. Kulkarni, **Chem. Phys. Lett.**, 362 (2002) 261

Presentations (selected)

1. **Gordon Research Conferences – 2010, New Hampshire** X-ray induced reactions in adsorbed organic molecules (**Poster**)
2. **American Vacuum Society annual symposium – 56, San Jose, Nov.2009** Photo-induced reactions of L-alanine on Permalloy surface: A real time XPS study (**Poster**)
3. **European conference of Surface Science (ECOSS) – 23, Berlin, Sept.2005** Charge transfer dynamics in atomic and molecular adsorbate systems: Core hole clock spectroscopy (**Talk**)
4. **Summer School on “Condensed Matter Research: Microscopy/Spectroscopy”, Swiss Light Source, Aug.2005** Charge transfer dynamics in atomic and molecular adsorbate systems: Core hole clock spectroscopy (**Poster**)
5. **Deutsche Physikalische Gesellschaft (DPG) Annual conference, Berlin, March 2005** Adsorption geometry of hexafluorobenzene on Cu(111) surface: A polarization dependent NEXAFS study (**Talk**)
6. **Advanced Materials Workshop at JNCASR, India, 2001** Interaction between carbon disulfide and oxygen on a Ni(110) surface (**Poster**).