Dr. Franck Rose

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PERSONAL

French Citizen
Married

EDUCATION

UNIVERSITÉ PIERRE ET MARIE CURIE PARIS VI, FRANCE
PhD in Condensed Matter Physics, 2000.
Master in Condensed Matter Physics, 1997.
Bachelor in Fundamental Physics, 1997.

AWARDS & HONORS

Japan Society for the Promotion of Science Fellowship for Foreigners, 2004-2006.
European Community Marie Curie Fellowship, 2001-2002.
French Ministry of Research Doctoral Fellowship, 1997-2000.

RESEARCH RECORD

LAWRENCE BERKELEY NATIONAL LABORATORY (LBNL), BERKELEY, USA
Variable Temperature-UHV STM: hydrophobicity/hydrophilicity at the atomic scale
2006-2008, Visiting Physicist Post Doctoral Fellow. Advisor, **Prof. Dr. M. Salmeron**.
University of California at Berkeley, LBNL Materials Sciences Division.

UNIVERSITY OF TOKYO, INSTITUTE OF INDUSTRIAL SCIENCE (IIS), TOKYO, JAPAN
NC-AFM true atomic resolution/MEMS-AFM for sensing and lithography
2004-2006, JSPS Postdoctoral Fellow. Advisor, **Prof. Dr. H. Kawakatsu**.
Laboratory for Integrated Micro Mechatronic Systems (LIMMS),
Centre National de la Recherche Scientifique (CNRS).

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN (UIUC), ILLINOIS, USA
Spin Interactions and Spin Dynamics in Electronic Nanostructures
2002-2003, Visiting Research Assistant Professor. Advisor, **Prof. Dr. A. Yazdani**.
Physics Seitz Material Research Laboratory & Loomis Laboratory of Physics.

FREIE UNIVERSITÄT (FU) & PAUL-DRUDE-INSTITUT (PDI), BERLIN, GERMANY
Building and Installation of a New STM Laboratory
2000-2002, Marie Curie Fellow. Advisor, **Dr. G. Meyer**.
FU Department of Physics, Prof. Dr. K.-H.Rieder's group, & PDI Nano-Acoustics group.

CNRS & UNIVERSITÉ PARIS-SUD (PARIS XI), ORSAY, FRANCE
●**Manipulation of Individual Atoms and Molecules with the STM**
1997-2000, PhD Student. Advisor, **Dr. G. Dujardin**.
Laboratoire de Photophysique Moléculaire (LPPM).
●**Synchrotron Radiation Experiment on Ge(111)-c(2×8):H at Super-ACO**
1998, PhD Student. Advisor, **Dr. G. Dujardin**.
Laboratoire pour l'Utilisation du Rayonnement Electromagnétique (LURE).
●**Atom manipulation on the Ge(111)-c(2×8) surface studied with the RT-UHV STM**
1996-1997, Undergraduate Honor Thesis. Advisor, **Dr. G. Dujardin**.
Laboratoire de Photophysique Moléculaire (LPPM).

UNIVERSITÉ PIERRE ET MARIE CURIE PARIS VI, FRANCE
Non ergodic evolution of the dielectric constant in dipolar glasses of $K_{1-x}Li_xTaO_3$.
1996, Undergraduate Student. Advisor, **Prof. Dr. P. Doussineau**.
Laboratoire d'Optique et d'Acoustique de la Matière Condensée.

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ACADEMIC ACTIVITIES

ORGANIZER & SESSION CHAIR, *BIO NANO ROBO SEMINAR SERIES*

2005-2006 (monthly) University of Tokyo, Japan.
URL: URL: http://limmshp.iis.u-tokyo.ac.jp/mediawiki/index.php/BIO-NANO-ROBO_Seminar_Series
Among many distinguished speakers: **S.Iijima**, inventor of carbon nanotubes, **A.Fujishima**, inventor of photocatalysis, **N.Hirokawa**, inventor of molecular motors, **H.Sakaki**, inventor of quantum dots, and **T.Ohtsu**, inventor of nanophotonics.

Past: Organizing Activities
Co-organizer, European Community Marie Curie Workshop, Berlin, Germany (2001).
Session chair, TMR network Atom/Molecular Manipulation, Berlin, Germany (2000).

DEPARTMENTAL & UNIVERSITY SERVICE

TEACHING ASSISTANT (UNIVERSITY PARIS-SUD, PARIS XI, ORSAY, FRANCE)

- Quantum Mechanics and Atomic Theory, Physics Department (1999-2000).
- Numerical Methods, Chemistry Department (1999-2000).
- Microsoft Office, Chemistry Department (1999-2000).

EDITORIAL ACTIVITIES

REVIEWER

Journal of Chemical Physics, Journal of Micromechanics and Microengineering, Journal of Physics D: Applied Physics, Measurement Science and Technology, Nanotechnology, Small

RESEARCH HIGHLIGHTS

PRESENT PROJECT (BERKELEY)

- Catalysis: LT-STM studies of H, H_2O, C_2H_2, and graphene on Ru(001) and Pd(111) (2006-2008).

RESEARCH PROJECTS WITH LIMMS (TOKYO)

- NC-AFM true atomic resolution of GaAs(100), AlNiCo Quasi-crystals, and HOPG nanosheets (2005-2006).
- Fabrication of HOPG nano- cantilevers, bridges, and membranes (2005-2006).
- AFM investigations of DNA and microtubules adsorption on HOPG (2005-2006).
- FIB micropatterning of HOPG/Si heterostructures for DNA biosensors (2005-2006).
- FIB-created ripples on HOPG, Si, GaAs, and CaF_2 (2005-2006).
- FIB-synthesized nanolaces on suspended HOPG nanosheets (2005-2006).
- NC-AFM, STS, STM, and adsorption studies (H, O_2) of coexisting Si(111)-c2×8, -7×7, and -2×1 reconstructions (2005).
- Fluidic self-assembly of micro-cantilevers (2004-2005).
- Single atom mass sensors (2004-2006).

PREVIOUS ACHIEVEMENTS (STM MANIPULATIONS)

- STM lateral manipulation of magnetic atoms (Mn) on GaAs(110) at 4K (2002).
- Molecular Manipulations with the LT- STM: Nanotube/Au(111) (2002).
- Atomic Manipulations with the LT- STM: Xe and Cu/Cu(211) (2001).
- STM induced desorption of individual hydrogen atoms on the Ge(111) (2001).
- STM manipulations of oxygen adsorbates (silicate type) on Si(111) (2001).
- H induced toggling of the Ge(111) work function (2001).
- **O**xidation chain reaction on the Ge(111) triggered by STM made active sites (1999).
- Demonstration of the direct STM tip-surface contact manipulation method (Ge) (1998).

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TECHNICAL REALIZATIONS

CONSTRUCTION & SET UP OF A STM LABORATORY (PDI, BERLIN)

- Complete room installation.
- Fully designed constructed and tested 4K UHV STM system.
- Purchase, installation, and test of scientific equipments.

SCANNING TUNNELING MICROSCOPY (UHV-STM)

- Fully designed and constructed systems: Dr. G.Meyer-type STM, 4K, (marketed by VTS-Createc). Dr. Pan-type STM, RT, in air, with ESR system (Prof. M.Welland-type ESR-STM: electron-spin resonance).
- Modified systems: Dr. D.Eigler-type STM, 4K; Prof. Salmeron-type VT-STM, RT-45K
- Installed tested and operated system: Omicron VT-STM, RT-25K.
- Operated systems: Prof. Dr. W.Ho-type STM, 4K. Omicron STM1, RT.

TECHNICAL SKILLS

SCANNING PROBE MICROSCOPIES (SPM)

- Non-Contact Atomic Force Microscopy (NC-AFM: JEOL).
- Atomic Force Microscopy (AFM: JEOL, Digital Instruments).
- Field Emission Scanning Electron Microscope (FE-SEM: JEOL, Hitachi).
- Focused Ion Beam (FIB: Hitachi).
- Synchrotron Source Facility, LURE: UV Photoelectron Spectroscopy (UPS), Near-Edge X-Ray Adsorption Fine Structure (NEXAFS), and Photon Stimulated Desorption (PSD).

CLEAN ROOM MICROFABRICATION

- Photolithography.
- Deep Reactive Ion Etching, Chemical Etching.
- Electron Beam Draw.
- Soft-lithography (PDMS stamping).

SURFACE SCIENCE (UHV STUDIES)

- Semiconductors: Ge(111), Si(111)&(110), GaAs(110)&(100), SiC(111), HOPG.
- Magnetic heterostructures, quantum dots, δ dopant in III/V.
- Metals: Cu(211) & (100) & (111), Au(111), Ag(110), NiAl(110), Pd(111), Ru(001).
- High-T_c superconductors: $Bi_2Sr_2CaCu_2O_x$.
- Quasi-crystals: AlNiCo.
- Nanotubes: single-wall carbon nanotube, carbon peapods.

BIOLOGICAL SAMPLES (AFM STUDIES)

- λ-Phage DNA.
- Microtubules.
- Cells.

LT-UHV SYSTEMS

- Surface Science Techniques: LEED, Auger, Ion Sputtering, Adsorption.
- Chemical preparation of surfaces & Cleavage of wafers for UHV purpose.
- Ultra High Vacuum (UHV 10^{-11} T), Turbo & Ionic Pumps.
- Low Temperature (LT), Liquid Helium & Hydrogen, Cryostat.

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PUBLICATIONS

24. F.Rose, H.Fujita, and H.Kawakatsu
Real time observation of FIB-created dots and ripples on GaAs
Nanotechnology, 19, 035301 (2008)

23. M.Tatarkhanov, F.Rose, E.Fomin, D.F.Ogletree and M.Salmeron
Hydrogen Adsorption on Ru(001) Studied by Scanning Tunneling Microscopy
Surface Science, 602, 487, (2008)

22. F. Rose, M. Tatarkhanov, E. Fomin, D. F. Ogletree and M. Salmeron
The Nature of the Dissociation Sites of Hydrogen Molecules on Ru(001)
Journal of Physical Chemistry C, 111, 19052 (2007)

21. S.Kawai, F.Rose, T.Ishii, S.Tsukamoto, and H. Kawakatsu
Dynamic Force Microscopy Study of the As-rich c(4×4) and Ga-rich c(8×2) Reconstructions of the GaAs(001) Surface
Journal of Applied Physics, 102, 024307 (2007)

20. F.O.Morin, F.Rose, P.Martin, M.C.Tarhan, H.Kawakatsu and H, Fujita
Combing and Self-assembly Phenomena in Dry Films of Taxol-Stabilized Microtubules
Nanoscale Research Letters, 2, 135 (2007)

19. Y.A.Chapuis, A.Debray, and F.Rose
Self-Assembly and Surface Science Techniques Used in MEMS/NEMS Fabrication
"MEMS and its Material Technologies", *edited by M. Ichiki, Research Signpost,* Trivandrum, Kerala, India (2007)

18. F.Rose, A.Debray, P.Martin, H.Fujita, and H.Kawakatsu
Suspended HOPG Nanosheets for HOPG Nanoresonators Engineering and New Carbon Nanostructures Synthesis
Nanotechnology 17, 5192 (2006)

17. F.Rose, S.Kawai, T. Ishii, and H.Kawakatsu
Scanning Tunneling Spectroscopy and Topography of Si(111)-c(2×8) and Coexisting 7×7 and 2×1 Reconstructions: Surface Electronic Band Structure
Physical Review B 73, 045309 (2006)

16. F.Rose, S.Kawai, and H.Kawakatsu
Low Reactivity of Molecular Oxygen with Si(111)-c(2×8)
Surface Science 600, 106 (2006)

15. S.Kawai, F.Rose, and H.Kawakatsu
Atomically Resolved Observation of the Quenched Si(111) Surface with Small Amplitude Dynamic Force Microscopy
Journal of Applied Physics 99, 104312(2006)

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PUBLICATIONS (CONTINUED)

14. F.Rose, P.Martin, H.Fujita, and H.Kawakatsu
Adsorption and Combing of DNA on HOPG Surfaces of Bulk Crystals and Nanosheets: Application to the Bridging of DNA between HOPG/Si Hetero-structures
Nanotechnology 17, 3325 (2006)

13. F.Rose, M.Hattori, D.Kobayashi, H.Toshiyoshi, H.Fujita, and H.Kawakatsu
Application of Capillary Forces and Stiction for Lateral Displacement, Alignment, Suspension, and Locking of Self-Assembled Microcantilevers
Journal of Micromechanics and Microengineering 16, 2077 (2006)

12. P.Martin, F.Rose, F.Morin, H.Fujita and H.Kawakatsu
FIB-created HOPG/SiO_2 Heterostructures for Adsorbed and Suspended DNA
IEEE Technical Digest of International Conference on Microtechnologies in Medicine and Biology (MMB2006) Okinawa, Japan, 173 (2006)

11. H.Kawakatsu, S.Kawai, D.Kobayashi, M.Hattori, S.Nishida, F.Rose, S.Kitamura, and S.Meguro
Atomic Force Microscopy Utilizing Sub-Angstrom Cantilever Amplitudes
Seisan-Kenkyu, 58(2), 93 (2006)-Cover Story

10. F.Rose, T.Ishii, S.Kawai, and H.Kawakatsu
Non-Contact Atomic Force Microscopy and Scanning Tunneling Microscopy of Coexisting Reconstructions on Si(111)
e-Journal of Surface Science and Nanotechnology 3, 258 (2005)

9. A.J.Mayne, F.Rose, G.Comtet, L.Hellner and G.Dujardin
Variable Temperature STM Studies of the Adsorption of Oxygen on the Si(111)-7×7 surface
Surface Science 528, 132 (2003)

8. A.J.Mayne, F.Rose, and G.Dujardin
An STM Study of the Growth Behavior of the Oxidation of the Ge(111) Surface
Surface Science 523, 157 (2003)

7. G.Dujardin, A.J.Mayne, and F.Rose
Temperature Control of Electronic Channels Through a Single Atom
Physical Review Letters 89 (3) 036802 (2002)

6. A.J.Mayne, F.Rose, C.Bolis, and G.Dujardin
An Scanning Tunneling Microscopy Study of the Diffusion of a Single or a Pair of Atomic Vacancies,
Surface Science 486 (3), 226 (2001)

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PUBLICATIONS *(CONTINUED)*

5. G.Dujardin, F.Rose, J.Tribollet and A.J.Mayne
Inelastic Transport of Tunnel and Field Emitted Electrons Through a Single Atom
Physical Review B 63, 081305 (R) (2001)

4. G.Dujardin, F.Rose, and A.J.Mayne
Toggling the Local Surface Work Function by Pinning Individual Promoter Atoms
Physical Review B 63, 235414 (2001)

3. A.J.Mayne, F.Rose, and G.Dujardin
Inelastic Interactions of Tunnel Electrons with Surfaces
Faraday Discussions 117, 241 (2000)

2. G.Dujardin, A.J.Mayne, and F.Rose
Surface Molecular Chain Reaction Initiated at STM-Made Individual Active Sites
Physical Review Letters 82 (17), 3448 (1999)

1. G.Dujardin, A.J.Mayne, O.Robert, F.Rose, C.Joachim, and H.Tang
Vertical Manipulation of Individual Atoms by a Direct STM Tip-Surface Contact on the Ge(111) Surface
Physical Review Letters 80 (14), 3085 (1998).

PRESS

G.Dujardin, A.J.Mayne, and F.Rose
Handling the Atom
Seeds of Science: Advances of Science, 92 (1999)

G.Dujardin, A.J.Mayne, and F.Rose
Manipuler l'Atome
Plein Sud Spécial Recherche *1999*, 74 (1999)

Collaborations to:
Pour la Science, Science et Vie Junior, Sciences et Avenir Hors-série (1999-2001)

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INVITED TALKS — **SEMINARS & COLLOQUIUMS AT UNIVERSITIES AND RESEARCH INSTITUTIONS**

Molecular Foundry, Lawrence Berkeley National Laboratory, California, USA (2007).
IAMS, Academia Sinica, Taipei, Taiwan (2006).
University of Tokyo, Tokyo, Japan (2005).
Manchester University, Manchester, UK (2004).
Queen's University, Belfast, Northern Ireland (2004).
University of Neuchatel, Neuchatel, Switzerland (2004).
University of Illinois, Urbana-Champaign, USA (2002).
University of Cambridge, Cambridge, UK (2002).
Paul-Drude-Institut, Berlin, Germany (2001).
Freie Universität, Berlin, Germany (2001).
German Ministry of Research, Berlin, Germany (2001).
National Research Council Canada, Ottawa, Canada (2001).
Pennsylvania State University, University Park, Pennsylvania, USA (2001).
IBM Research Division, Zurich, Switzerland (2000).
Fritz-Haber Institute, Berlin, Germany (2000).
Centre National de la Recherche Scientifique (CNRS), Paris, France (2000).
LPPM, Université Paris-Sud, Orsay, France (2000).
Ecole de Physique des Houches, Les Houches, France (1998).
Ecole Supérieur de Physique Chimie Industrielle (ESPCI), Paris, France (1997).

TALKS — **NATIONAL & INTERNATIONAL CONFERENCES**

APS March Meeting 2008, New Orleans, USA (2008).
International Symposium on Surface Science and Nanotechnology, Tokyo, Japan (2005).
European Community Marie Curie Workshop, Berlin, Germany (2001).
TMR network Atom/Molecular Manipulation, Berlin Germany (2000).
TMR network Atom/Molecular Manipulation, Toulouse, France (1999).
Congrés Général de la Société Française de Physique, Clermont-Ferrand, France (1999).
TMR network Atom/Molecular Manipulation, Paris, France (1998).

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REFEREES

Dr. Gerald Dujardin
Laboratoire de Photophysique Moleculaire, Batiment 210, Université Paris-Sud 91405 Orsay Cedex, France.
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URL: http://www.ppm.u-psud.fr/

Prof. Dr. Hiroyuki Fujita
Fujita Laboratory (CIRMM/LIMMS), Ew304, Institute of Industrial Science, University of Tokyo, Komaba 4-6-1, Meguro-ku, Tokyo 153-8505, Japan.
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URL: http://www.fujita3.iis.u-tokyo.ac.jp/

Dr Christian Joachim
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Kawakatsu Laboratory (CIRMM/LIMMS), Dw-701, Institute of Industrial Science, University of Tokyo, Komaba 4-6-1, Meguro-ku, Tokyo 153-8505, Japan.
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