

Curriculum Vitae

Emanuel (Marc) Lörtscher

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Date of Birth

Nationality

Work

IBM Research GmbH
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Swiss



Professional Development

01/07 – 06/08 **Post-Doctoral Researcher**, Science and Technology Department, IBM Research Laboratory, Zurich, Switzerland.

Project topic: Molecular-Scale Electronics and Strain in Nanostructures.

11/06 **PhD thesis** *Summa cum laude*, University of Basel
(Prof. Dr. Ch. Schönenberger).

Title: “Charge-Carrier Transport Measurements through Single Molecules”.

01/04 – 10/06 **PhD work**, Science and Technology Department, IBM Research Laboratory, Zurich, Switzerland (Dr. H. Riel, Dr. habil. W. Riess).

Project topic: Molecular-Scale Electronics.

03/03 **Diploma degree in physics**, Dipl.-Phys. ETHZ, received from the Swiss Federal Institute of Technology Zurich (ETHZ).

10/02 – 02/03 **Diploma thesis**, Science and Technology Department, IBM Research Laboratory, Zurich, Switzerland (Dr. H. Riel, Dr. habil. W. Riess).

Title: “Absolute Quantum Efficiency of Photoluminescence of Thin Organic Layers and Magnetic Field Effects of Organic Light-Emitting Devices”.

06/02 – 07/02 **Semester work**, Institute for Quantum Electronics, Swiss Federal Institute of Technology Zurich (ETHZ) (Prof. Dr. P. Günter).

Title: “Charge Transport Studies in Organic-Field-Effect Transistors”.

01/98 – 12/00 **Practical training** (Anfängerpraktikum und Vorgerücktenpraktikum), Physics Department, Swiss Federal Institute of Technology Zurich (ETHZ).

Recent Accomplishments

- First demonstration of bistable switching of a single molecule in a break-junction experiment. It was demonstrated that this intrinsic molecular functionality and the control achieved can be used to employ a single molecule as a non-volatile memory element (08/06).

Awards and Accomplishments

- 2007 IBM Research Division Technical Accomplishment (Science and Base Technology). "Materials Science of Semiconducting Nanowires".
- Faculty Prize 2007 of the University of Basel.
- 2007 IBM Outstanding Technical Achievement Award (Science and Base Technology). "Reversible and Controllable Switching of a Single-Molecule Junction".
- Swiss Physical Society 2007 Award for Applied Physics ("Oerlikon Prize").
- 2006 "Summa cum laude" from the University of Basel for PhD.
- 2006 IBM Research Division Technical Accomplishment (Science and Base Technology). "Reversible and Controllable Switching of a Single-Molecule Junction".

Selected Technical Skills

- Fabrication and electrical characterization of single-molecule junctions.
- Fabrication and electrical characterization of semiconductor nanowire devices.
- Design and fabrication of electron-beam lithography microstructures.
- Energy dispersive X-ray (EDX) analysis, Scanning Electron Microscopy (SEM)
- Various other fabrication techniques, such as optical photolithography, reactive ion etching.
- Electrical and optical characterization of organic multilayer light-emitting devices.
- Measurement and optimization of the absolute quantum efficiency of photoluminescence of thin organic layers.
- Instrumentation, automation and signal processing.
- Computer Applications: MS DOS, Microsoft Windows, Linux, LabView, C++, HTML, Microsoft Office, Access, CorelDraw, MathCad, Macromedia, LaTeX, Matlab, Obtree Content Manager, Novell GroupWise, Origin, and Maxwell 2D.

Work experience

2003	Magnetic-field studies in Swiss Railways, joint collaboration with the Swiss Federal Office for Transport (BAV) and the Swiss Federal Office of Public Health (BAG).
2002	Development of database applications and HTML programming for various customers.
1998 – 2002	IT coordinator at PAX, Schweizerische Lebensversicherungs-Gesellschaft, Zurich.
1997 – 1998	Internship at PAX, Schweizerische Lebensversicherungs-Gesellschaft, Zurich.
1993 – 1996	Internship at Engineering-Organization-Traction (ENOTRAC) AG, Uetendorf.

General Education

10/97 – 03/03	Physics studies at the Swiss Federal Institute of Technology Zurich (ETHZ).
1997	Military Service, Gebirgsinfanterie, Chur.
1992 – 1997	Matura Type C (Math & Science), Urdorf.
1990 – 1992	Sekundarschule, Bonstetten.
1984 – 1990	Primarschule, Wettswil.

Languages

- German (mother tongue Swiss German).
- English (good).
- French (basic knowledge).

Other interests

Mountain biking, skiing, hiking, running, climbing, model railways.

List of Publications

- **E. Lörtscher**, J. W. Ciszek, J. M. Tour, and H. Riel. *A Single-Molecule Switch and Memory Element*. Journal of Physics, Vol. 61, Pages 987 – 991, 2007.
- **E. Lörtscher**, H. B. Weber, and H. Riel. *Statistical Approach to Investigating Transport through Single Molecules*. Physical Review Letters, Vol. 98, Pages 176807–1–4, 2007.
- **E. Lörtscher**, J. W. Ciszek, J. M. Tour, and H. Riel. *Reversible and Controllable Switching of a Single-Molecule Junction*. Small, Vol. 2, Pages 973 – 977, 2006.
- O. Hayden, M. T. Björk, H. Schmid, H. Riel, U. Drechsler, S. F. Karg, **E. Lörtscher**, W. Riess. *Fully Depleted Nanowire Field-Effect Transistor in Inversion Mode*. Small, Vol. 3, Pages 230 – 234, 2006.
- **E. Lörtscher**, M. Elbing, M. Mayor, A. Afzali-Ardakani, C. Kagan, C. Rettner, and H. Riel. *Transport Studies through Thiol and Isocyanide Coupled Metal-Single-Molecule-Metal Junctions*. Manuscript in preparation, 2007.
- **E. Lörtscher** and H. Riel. *Single-Molecule Switch and Memory Element*. European Research Consortium for Informatics and Mathematics, No. 67, pages 50 – 51, 2006.
- **E. Lörtscher**, M. Elbing, C. von Hänisch, H. B. Weber, M. Mayor, and Heike Riel. *Length-dependent Transport in Molecular Rods with Reduced π -Conjugation*. Submitted to ACS Nano, 2007.
- M. Rösli, M. Lörtscher, M. Egger, D. Pfluger, N. Schreier, **E. Lörtscher**, P. Locher, A. Spoerri, Ch. Minder. *Leukaemia, Brain Tumours and Exposure to Extremely Low Frequency Magnetic Fields: Cohort Study of Swiss Railway Employees*. Occupational and Environmental Medicine, May, 2007 (doi:10.1136/oem.2006.030270).
- M. Rösli, M. Lörtscher, M. Egger, D. Pfluger, N. Schreier, **E. Lörtscher**, P. Locher, A. Spoerri, Ch. Minder. *Mortality from Neurodegenerative Disease and Exposure to Extremely Low-Frequency Magnetic Fields: 31 Years of Observations on Swiss Railway Employees*. Neuroepidemiology, Vol. 28, No. 4, 2007.
- M. Lörtscher, **E. Lörtscher**. *Niederfrequente elektromagnetische Felder in Führerständen von Triebfahrzeugen der SBB*. Elektrische Bahnen, Vol. 8–9, 2004.

List of Presentations

Invited talks

- E. Lörtscher, and H. Riel. *Introduction to Molecular Electronics: Single-Molecule Transport Studies*. Summerschool of the Marie Curie Network of Excellence Bimore, San Benedetto del Tronto, 2007
- E. Lörtscher. *Charge Transport Measurements through Single Molecules*. Annual Meeting of the Swiss Physical Society (SPS), Zurich, 2007.
- E. Lörtscher, J. W. Ciszec, J. M. Tour, and H. Riel. *A Statistical Approach for Electrical Transport Investigations through Single Molecules*. Material Research Society (MRS) Spring Meeting, San Francisco, 2006.

Contributed talks

- E. Lörtscher, J. W. Ciszec, J. M. Tour, H. B. Weber, and H. Riel. *A Statistical Approach for Electrical Transport Investigations through Single Molecules*. ICN+T, Basel, 2006.
- E. Lörtscher, H. B. Weber, and H. Riel. *A Statistical Approach for Electrical Transport Investigations through Single Molecules*. Transport through Single Molecules, Leiden, 2005.

Posters

- E. Lörtscher, J. W. Ciszec, J. M. Tour, and H. Riel. *A Single-Molecule Switch and Memory Element*. Trends in Nanoscience, Kloster Irsee, 2007.
- E. Lörtscher, J. W. Ciszec, J. M. Tour, and H. Riel. *A Single-Molecule Switch and Memory Element*. Wilhelm and Else Heräus Seminar about Quantum Transport at the Molecular Scale, Bad Honnef, 2006.
- E. Lörtscher, H. B. Weber, and H. Riel. *A Statistical Approach for Electrical Transport Investigations through Single Molecules*. Transport through Single Molecules, Leiden, 2005.
- E. Lörtscher, H. B. Weber, and H. Riel. *Statistical Transport Investigations through Single Molecules*. NCCR Annual Meeting, Gwatt, 2005.
- E. Lörtscher, H. B. Weber, and H. Riel. *Statistical Transport Investigations through Single Molecules*. 3rd European Conference on Organic Electronics and Related Phenomena (ECOER), Winterthur, 2005.
- E. Lörtscher, S. Karg, H. Riel, and W. Riess. *Absolute Quantum Efficiency of Photoluminescence of Light-Emitting Devices*. Wilhelm and Else Heräus Summer school, Wittenberg, 2004.