

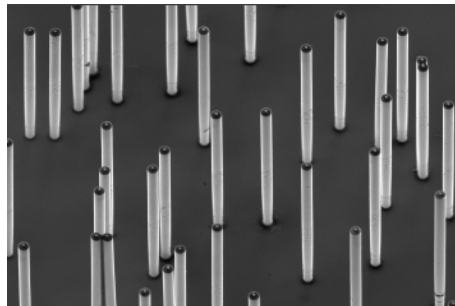
European Network on Ion Track Technology (EuNITT)

Workshop on Ion Track Technology

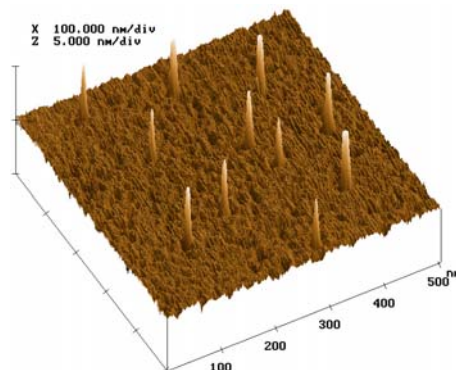
Phenomena in nanometer geometries
based on swift heavy ion tracks

February 25 - 27, 2004

**The Ångström Laboratory
Uppsala University, Sweden**



J. Vetter (GSI-Darmstadt)



N Khalfaoui, C. Rotaru (CIRIL-Caen)

Wednesday, February 25

Registration and Reception

18:00 – 21:00 at The Ångström Laboratory, Uppsala University

The Ångström Café, Ground floor at the Main Entrance

18:30, 19:00, 19:30 - Tours of The Ångström Laboratory

Thursday, February 26

8:00 – 8:45 Workshop Registration

The Ångström Café, Ground floor outside The Hägg Hall (Häggsalen)

Filter and Template Technology

Chairman: R. Neumann, GSI, Darmstadt

8:50 – 9:00 Welcome to Uppsala University and The Ångström Laboratory

B. Sundqvist, Vice Chancellor, Uppsala University

K. Hjort, Director of SUMMIT, Uppsala University

9:00 – 9:30 Ion track technology at FLNR JINR: membranes and other applications

S.N. Dmitriev, P.Yu. Apel (**invited**), G.G. Gulbekian, B.N. Gikal, O.M. Ivanov, V.F. Reutov, V.A. Skuratov

Flerov Laboratory of Nuclear Reactions, Dubna, Russia

9:30 – 9:45 Ion track developed polyimide resist on wafers as template for nanowires

M. Skupinski(a), M. Toulemonde(b), M. Lindeberg(a), K. Hjort(a)

(a) The Ångström Laboratory, Uppsala University, Sweden

(b) Laboratoire CIRIL, Caen, France

9:45 – 10:00 Track etched nanopores in polycarbonate foils: attempts for large scale integration of numerous nano-pores

N. Sertova(a), M. Toulemonde(a), E. Balanzat(a), Z. Siwy(b), C. Trautmann(b)

(a) CIRIL-GLANIL, Caen, France

(b) Materialforschung, GSI, Darmstadt, Germany

10:00 – 10:15 Critical beam parameters of heavy ion accelerators for track formation and chemical track etching

M. Toulemonde(a), C. Trautmann(b)

(a) CIRIL, Caen, France

(b) Materialforschung, GSI, Darmstadt, Germany

10:15 – 10:30 Surface nano-structuring by etching of swift ion-irradiated SiO₂/Si layers

C. Rotaru, M. Kac, H. Lebius

CIRIL, Caen, France

10:30 – 11:00 Coffee

Nanowire 1: Optical, Field Emission, and Conduction Phenomena

Chairman: K. Hjort, The Ångström Laboratory, Uppsala University

- 11:00 – 11:30 Aligned cobalt nanowire arrays for field emission applications**
P. Legagneux(a) (**invited**), L. Vila(b), P. Vincent(a), L. Dauginet.De Prac(b), G. Pirio(a), E. Minoux(a), L. Gangloff(a), S. Desmoustier-Champagne(b), J-P Schnell(a), E. Ferain(b), R. Legras(b), L. Piraux(b)
(a) THALES Research and Technology, Orsay, France
(b) University of Louvain-la-Neuve, Belgium
- 11:30 – 11:45 Novel optical waveguides by latent track ion irradiation**
J. Olivares(a), G. García López(b), F. Agulló-López(b)
(a) Instituto de Óptica "Daza de Valdés", CSIC, Madrid, Spain
(b) Centro de Microanálisis de Materiales, Madrid, Spain
- 11:45 – 12:00 Field emission studies on swift heavy ion irradiated tetrahedral amorphous carbon**
D. Schwen(a), C. Ronning(a), H. Hofsäss(a), J-H Zollondz(b), A. Weidinger(b)
(a) Institute of Physics, University of Göttingen, Göttingen, Germany
(b) Hahn-Meitner-Institute, Berlin, Germany
- 12:00 – 12:15 Single crystals of conductive inorganic nanofibriles and nanotubules**
M. Abid(a), A. Jouati(b)
(a) Material Science Laboratory, The Ångström Laboratory, Uppsala University, Sweden
(b) LCCO Louis Pasteur University, France
- 12 :15 – 12 :30 Crystallographic investigations on electro-chemically deposited bismuth nanowires**
T.W. Cornelius(a), J. Brötz(b), N. Chantko(a), D. Dobrev(a), G. Miehe(b), R. Neumann(a), M.E. Toimil Morales(a)
(a) GSI, Darmstadt, Germany
(b) University of Technology, Darmstadt, Germany
- 12:30 – 14:00 Lunch**

Nanowire 2: Magnetic Phenomena

Chairman: J.P. Ansermet, EPFL, Lausanne

- 14:00 – 14:30 Nanowires in spintronics**
L. Gravier (**invited**), X. Hoffer, A. Fabian, S. Serrano Guisan, C. Terrier, D. Carlier, J.-Ph. Ansermet
Institut of Physique des Nanostructures, Lausanne-EPFL, Switzerland
- 14:30 – 14:45 Magnetoresistance sensor using ferro-magnetic nanowires electrodeposited into heavy ion track etched polymer templates**
T. Ohgai(a), I. Enculescu(a), C. Zet(a), L. Westerberg(b), J.-Ph. Ansermet(c), R. Spohr(a)
(a) Materials Research, GSI, Darmstadt, Germany
(b) The Svedberg Laboratory, Uppsala University, Uppsala, Sweden
(c) Institute de Physique des Nanostructures, Lausanne-EPFL, Switzerland
- 14:45 – 15:00 Ni nanowires electrodeposited in ion track templates.**
M. Daub(a), I. Eculescu(a,b), R. Neumann(a), R. Spohr(a)
(a) GSI, Darmstadt, Germany
(b) National Institute of Materials Physics, Bucharest, Roma
- 15:00 – 15:15 Ion track enabled Kapton-HN™ PCB-Process technology for sensor applications**
M.Lindeberg, H.Yousef, K.Hjort
The Ångström Laboratory, Uppsala University, Sweden

- 15:15 – 15:30 Cu/Co nanowires prepared in single pore ion track membranes - a magnetic field sensor**
I. Enculescu(a), C. Zet(b), M. Daub(b), K. Hjort(a), R. Neumann(b), R. Spohr(b)
(a) The Ångström Laboratory, Uppsala University, Sweden
(b) GSI, Darmstadt, Germany
- 15:30 – 16:15 Coffee**
- 16:15 – 16:45 Magnetic properties of Cu-Ni alloy and multilayer nanowires**
A. Robinson, I. Kazeminezhad, P. Southern, W. Schwarzacher (**invited**)
H.H. Wills Physics Laboratory, Bristol, U.K.
- 16:45 – 17:00 Swift ion irradiation of magnetostrictive multilayers**
J. Juraszek(a), J. Teillet(a), F. Petit(b), J. Ben Youssef(b), M. Toulemonde(c)
(a) GPM-UMR 6634 Université de Rouen, , Saint-Etienne du Rouvray, France
(b) Laboratoire de Magnétisme de Bretagne, Brest Cedex, France
(c) Laboratoire CIRIL, GANIL, Caen Cedex, France
- 17:00 – 17:15 Ion modification of the structural properties of Fe/Cr and Fe/Tb multilayers**
M. Kac(a), M. Toulemonde(a), J. Jaworski(b), R. Kruk(b), M. Marszalek(b), S. Protsenko(b),
V. Tokman(b)
(a) CIRIL, Caen, France
(b) Niewodniczanski Institute of Nuclear Physics, Krakow, Poland
- 17:25 Bus to the The Svedberg Laboratory**
Presentation and Tour of the accelerator at the The Svedberg Laboratory
(walking distance to the Conference Party at Gustavianum and to the Hotels)
- 19:00 – 23:00 Conference Party**
The Old University House and Museum, Gustavianum

Friday, February 27

Ion – Matter Interactions

Chairman: P. Legagneux, THALES Research and Technology, Orsay

- 8:30 – 8:45 X-ray study of semiconducting single crystals implanted with swift heavy ions**
D. Żymierska(a), J. Choiński(b), K. Godwod(a), J. Adamczewska(a), K. Regiński(c)
(a) Institute of Physics, Warsaw, Poland
(b) Heavy Ion Laboratory of the University of Warsaw, Poland
(c) Institute of Electron Technology, Warsaw, Poland
- 8:45 – 9:00 "In-situ" luminescence as monitor of radiation defects under high energy heavy ion irradiation**
V.A. Skuratov
Center of Applied Physics, Dubna, Russia
- 9:00 – 9:15 Thermal spikes in swift heavy ion tracks in wide band gap dielectrics**
A.E. Volkov, M.V. Sorokin
Institute of General and Nuclear Physics, Russian Research Centre, Moscow, Russia
- 9:15 – 9:30 Relaxation of deformations produced by individual ions on PMMA thin films near glass transition**
R. Real, W. Hasenkamp, R.M. Papaléo
Faculty of physics, Porto Alegre, RS, Brazil

An event within the ECC RTN Programs EuNITT (HPRN-CT-2000-00047) and CELLION (MRTN-CT-2003-503923). Sponsored by the VINNOVA Industrial Competence Center on Surface and Microsystem Technology (SUMMIT).

9:30 – 9:45 **Structure of latent tracks created by swift uranium ions in polyimide:
A study by means of small-angle X-ray scattering**
S.A. Saleh, Y. Eyal
Dept. of Chemistry, Haifa, Israel

9:45 – 10:15 **Coffee**

10:15 - 10:45 **Recent work at GSI on heavy-ion irradiation of solids**
R. Neumann (invited)
GSI, Darmstadt, Germany

Irradiations and Processing Technology

Chairman: M. Toulemonde, CIRIL, Caen

10:45 – 11:00 **Damage annealing behaviours of mono-silicated Nd-substituted fluorapatite irradiated
with heavy ions**
R. Tisserand(a), M. Rebetez(a), M. Grivet(a), S. Bouffard(b), J. Carpena(c)
(a) EA 473 Microanalyse des matériaux, Besançon, France
(b) CIRIL, Caen, France
(c) Laboratoire chimie de conditionnement, St Paul lez Durance, France ; CEREGE, Aix en
provence, France

11:00 – 11:15 **Fabrication and applications of fine three-dimensional microstructures fabricated using
MeV proton beam**
V. Auzelyte(a), M. Elfman(a), P. Kristiansson(a), K. Malmqvist(a), L. Wallman(b), C.
Nilsson(a), J. Pallon(a), A. Shariff(a), M. Wegdén(a)
(a) Department of Nuclear Physics, Lund University, Lund, Sweden
(b) Department of Electrical Measurements, Lund University, Lund, Sweden

11:15 – 11:30 **Measurements of proton energy spectra with the use of LR115A, CR-39 and PM-355
track detectors**
K. Malinowski, E. Skladnik-Sadowska, M.J. Sadowski
Dept. of Plasma Physics & Technology, Warsaw, Poland

11:30 – 11:45 **Calibrations solid-state nuclear track detectors for high-temperature plasma
experiments**
A. Banaszak, A. Szydłowski, M.J Sadowski
Dept. of Plasma Physics & Technology, Warsaw, Poland

11:45 – 12:00 **System for irradiating polymer films with a preset number of ions**
C. Zet(a,b), H. Kiesewetter(b), R. Spohr(b)
(a) Technical University, Iași, Romania
(b) GSI, Darmstadt, Germany

12:00 – 12:15 **System for controlled preparation of nanochannels and nanowires, starting from single-
ion track membranes**
C. Anisko(a), P. Apel(b), H. Kiesewetter(d), M. Skoczylas(a), R. Spohr(d), C. Zet(c)
(a) Politechnika Białostocka, Poland
(b) JINR, Dubna, Russia
(c) Technical University, Iasi, Romania
(d) GSI, Darmstadt, Germany

12:15 – 12:30 **Characterization of ordered nanoporous alumina films with an ion beam**
A. Razpet(a), G. Possnert(a), A. Johansson(a), A. Hallén(b), K. Hjort(a)
(a) The Ångström Laboratory, Uppsala University, Sweden
(b) Department of Microelectronics & IT, Royal Institute of Technology, Stockholm, Sweden

12:30 – 12:45 Ultra Thin DE-Detector for Monitoring a Micro Beam
G. Thungström(a), S. Abdalla(a), L. Westerberg(b), Reimar Spohr(c), Christian Zet(c,d)
(a) ITEM, Mid-Sweden University, Sundsvall, Sweden
(b) The Svedberg Laboratory, Uppsala, Sweden
(c) GSI, Darmstadt, Germany
(d) Technical University Iasi, Romania.

12:45 – 13:00 Micromachining by ion track etching and projection lithography
H. Majjad(a), M. Lindeberg(a), A. Tunayar(b), K. Hjort(a)
(a) The Ångström Laboratory, Uppsala University, Sweden
(b) Institute of Microtechnology in Mainz (IMM), Mainz, Germany

12:45 – 14:30 Lunch

Biological Applications

Chairman: R. Spohr, GSI, Darmstadt

14:30 – 15:00 Bio-mimetic nanopores and transport process and transport processes therein
V.M. Aguilera (**invited**)
Unidad de Biofísica. Dept. Ciencias Experimentales, Univ. Jaume I, Castellón, Spain

15:00 – 15:15 DNA translocations through synthetic nanopores
B. Schiedt(a), K. Healy(b), A.P. Morrison(b), R. Neumann(a), Z. Siwy(c,d)
(a) GSI, Darmstadt, Germany
(b) Dept. Of Electrical Engineering, Univ. College Cork, Ireland
(c) University of Florida, USA
(d) Silesian University of Technology, Gliwice, Poland

15:15 – 15:30 pH-switchable ion transport and selectivity in nanopore membranes with fixed charges. A theoretical model.
P. Ramirez(a), A. Alcaraz(b), S. Mafé(c), J. Cervera(c), V.M. Aguilera(b), M. Aguilera-Arzo(b), J.J Garcia-Celma(b)
(a) Dept. Física Aplicada, Univ. Politécnica de Valencia, Spain
(b) Dept. Ciencias Experi., Univ. Jaume I, Castellón, Spain
(c) Dept. Termodinámica, Univ. Valencia, Spain

15:30 – 16:00 The status of ion microbeams in radiation biology
M. Folkard (**invited**), K.M. Prise, B. Vojnovic
Gray Cancer Institute, Mount Vernon Hospital, Northwood, UK

16:30 – 17:00 Technical aspects of the project “CELLION” (Studies on cellular response to targeted single ions using nanotechnology)
Z. Stachura (**invited**), J. Lekki
Institute of Nuclear Physics of the Polish Academy of Sciences (IFJ), Cracow, Poland

17:00 – 17:15 Conclusions
Klas Hjort
Uppsala University, Uppsala, Sweden

17:15 – Coffee

18:00 – 19:00 Meeting of The EuNITT Society