

**European PhD School on  
"NANOANALYSIS USING FINELY FOCUSED ION AND ELECTRON BEAMS"**

**EUROPEAN PHD SCHOOL WAS CREATED IN 2005 AND  
INITIALLY SPONSORED BY EU FP6 NANOBEAMS  
NETWORK OF EXCELLENCE**

**NOW IT IS FINANCIALLY SUPPORTED BY THE  
UNIVERSITY OF LUXEMBOURG AND CRP-GL**

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**OBJECTIVES**

**EUROPEAN PHD SCHOOL FOCUSES ON THREE COMPLEMENTARY  
TECHNIQUES:**

- I) SECONDARY ION MASS SPECTROMETRY (SIMS),**
- II) TRANSMISSION ELECTRON MICROSCOPY (TEM) AND**
- III) AUGER ELECTRON SPECTROMETRY (AES)**

**THE PURPOSE IS FORMING SPECIALISTS IN THE  
INTERDISCIPLINARY FIELD OF NANOANALYSIS.**

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**METHODS**

**THE SCHOOL CONSISTS OF FOUR TEACHING WEEKS AND ONE ANALYSIS WEEK EACH COMPOSING A TWO-YEAR CYCLE. THE FIRST TEACHING WEEK PROPOSES AN OVERVIEW ON SIMS, TEM AND AES ANALYTICAL TECHNIQUES WITH AN INTRODUCTION TO:**

- I) ION AND ELECTRON TO MATTER INTERACTIONS,**
- II) INSTRUMENTATION AND**
- III) APPLICATIONS.**

**THE THREE FOLLOWING TEACHING WEEKS PROVIDE AN IN-DEPTH UNDERSTANDING TO THESE TECHNIQUES WITH THE PURPOSE TO FORM SPECIALISTS IN THE FIELD.**

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**THE LAST ANALYSIS WEEK PERMITS THE ATTENDEES TO  
ANALYSE THEIR OWN SAMPLES OF INTEREST.**

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**LECTURES ARE HELD DURING THE MORNING  
PRACTICAL SESSIONS ARE PROVIDED IN THE AFTERNOON**

**LEADING PROFESSORS AND KEY RESEARCHERS IN THE FIELD  
ARE LECTURERS AND PRACTICAL TUTORS**

**THE PRACTICAL SESSIONS CONSIST OF TUTORIALS ON  
STATE-OF THE-ART INSTRUMENTATION IN SMALL GROUPS.**

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***THE CORE GROUP OF THE EUROPEAN PHD SCHOOL CONSISTS  
OF SIX MEMBERS:***

- 1) PROF. H.-N. MIGEON**  
CENTRE DE RECHERCHE PUBLIC GABRIEL LIPPMANN, G.\_D- LUXEMBOURG
- 2) PROF. S. SIEBENTRITT**  
UNIVERSITÉ DU LUXEMBOURG, G.-D. LUXEMBOURG
- 3) PROF. BENNINGHOVEN**  
ION-TOF GMBH, GERMANY
- 4) PROF. P. BERTRAND**  
UNIVERSITÉ CATHOLIQUE DE LOUVAIN, BELGIUM
- 5) PROF. J. MAYER**  
RWTH-AACHEN UNIVERSITY, GERMANY
- 6) PROF. G. N. MISEVIC,**  
UNIVERSITÉ DE ROUEN, FRANCE AND GIMMUNE GMBH, SWITZERLAND

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***RESULTS***

**DURING 2005-2008, IN THE FRAMEWORK OF THE EUROPEAN PHD SCHOOL TEACHING CYCLES 1 AND 2 (FIVE WEEKS EACH) HAVE BEEN SUCCESSFULLY COMPLETED AND CYCLE 3 AND 4 WHICH WILL BE COMPLETED IN 2009 HAVE BEEN STARTED.**

**CERTIFICATES OF SUCCESSFULLY COURSES COMPLETION WERE PROVIDED. THE CORE GROUP HAS PREPARED TEACHING PROGRAM FOR CYCLES 5-7 UNTIL 2012. THE LIST OF PROPOSED LECTURE COURSES CAN BE DOWNLOADED FROM [HTTPS://WWW.NANOBEAMS.ORG/PHD-SCHOOL.HTML](https://www.nano beams.org/phd-school.html).**

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***RESULTS***

**DURING THE PERIOD OF 2005-2008 80 PHD STUDENTS HAVE ATTENDED AND SUCCESSFULLY COMPLETED FIRST TWO CYCLES. 120 HOURS OF LECTURES WERE GIVEN (2 X 60 H), 128 HOURS PRACTICUM AND TWO WEEKS OF ANALYSES.**

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***CONCLUSION/APPLICATION TO PRACTICE***

**EUROPEAN PHD SCHOOL SUCCESSFULLY IMPLEMENTED AND SUSTAINED INTERDISCIPLINARY EDUCATION FOR PHYSICISTS, CHEMISTS AND BIOLOGISTS WITH RESULTS OF FORMING SPECIALISTS IN THE FIELD OF NANOANALYSIS.**

**THUS, IT IS CONTINUING TO CONTRIBUTE TO EDUCATION IN RAPIDLY DEVELOPING FIELD OF NANOSCIENCES AND TO TRANSFER OF NANOTECHNOLOGY TO INDUSTRIAL APPLICATIONS.**

**KEY WORD - EUROPEAN PHD SCHOOL, NANOANALYSIS, SIMS, TEM, AES, ION AND ELECTRON BEAMS,**

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***THANKS***

**EU FP6**

**MEMBERS OF THE MEMBERS OF CRP-GL**

**UNIVERSITY OF LUXEMBOURG**

**LECTURERS**

**DR. SOPHIA FANTECHI**