

Statement of International Academic Exchange among Centers of Excellence for Plasma Science and Technology

Preamble

Centers of Excellence (COE) for plasma science and technologies with multiple group cooperation in several countries, desiring to establish a mutually cooperative and supportive international relationship among them, and with a view to establishing appropriate arrangements for fruitful scientific exchange among them, herewith agree on a statement of academic exchange as outlined below.

Article 1 *Academic Exchange Partners*

a) **Plasma-Nano** (Japan):

In October 2002 the center of excellence (COE) for *Information Nano-Devices Based on Advanced Plasma Science* (Plasma-Nano) was started at Nagoya University under the 21st Century COE Program of the Japanese Government. In the Plasma-Nano program, innovative plasma technologies are developed on a basis of world-class academic expertise in plasma science, and the technologies are applied to practical nanoproceses for fabricating highly functional information devices such as high-speed logic circuits, high density memories, and super fine displays. The funding is expected to last for five years, involving about fifty reserachers in three groups (plasma science, information device, information system) and forty PhD students in five departments in Graduate School of Engineering, Nagoya University.

b) **SFB 591** (Germany):

In January 2003 a long term and large scale center of excellence funding on "*Universal Properties of Plasmas Far from Equilibrium: Heating, Transport, and Structures*" (SFB 591) was launched by the DFG. The project consists of 14 sub-projects and a similar number of research groups are involved at the universities in Bochum, Duisburg-Essen, Wuppertal, and Düsseldorf plus the research center in Jülich with the Textor experiment. All participants are located in the same area in North-Rhine-Westphalia within close vicinity. The research covers a wide range of topics in low and high temperature plasmas physics as well as astrophysics like chaotic transport, magnetic reconnection and turbulence, sheath phenomena, stochastic heating, or dust in laboratory and astrophysical plasmas. The funding is for a maximum of 12 years with regular evaluation every four years.

c) **CPST** (Germany):

In summer 2003 the *Center of Excellence for Plasma Science and Technology* (CPST) was founded at Bochum University by those groups working in the field of low temperature plasmas, including five groups in the physics and three groups in the electrical engineering department. The foundation of the CPST is supported by the university and the government of the State of North-Rhine Westphalia. The intention of the CPST is to combine experience from various faculties and research groups in order to collaborate with scientific and industrial partners on research and development in the field of low temperature plasmas and their applications. Funding by the government is for two years with the intention to continue further independently as a permanent institution.

d) **INP** (Germany):

The Institute for Low-Temperature Plasma Physics (INP) Greifswald founded in 1992 is one of the biggest non-university institutes working in the field of low-temperature plasma physics and technology in Europe. The mission of the INP is the research for technical applications of plasma processes in lighting systems, in electrical engineering, in biomedicine, for modification of solid surfaces and small particles as well as basic research for simulation and modeling of plasmas and their diagnostics. In the field of basic research, a close collaboration with the department of physics at Greifswald University is established within the frame of SFB 198.

The INP is supported by the government and third parties, an essential amount of financial support comes from industrial projects. The funding is regular with evaluation every 5-7 years.

e) **LPCM** (France):

The Plasmas and Thin Films Laboratory (LPCM) is part of the Jean-Rouxel Materials Research Institute (IMN) in Nantes university, France. LPCM is supported by both the university and the French CNRS to study and develop plasma processes of interest in the various areas of the microelectronics industry, as well as for the general field of the micro- and nano-technologies. LPCM has a long-standing experience in the use of the various types of plasma diagnostic techniques as well as of materials surfaces characterization techniques (XPS, ellipsometry, ...) which makes it a unique center of expertise for the understanding of plasma/surface interactions. Modeling of the processes in the bulk phase of plasmas as well as of their interaction with surfaces is also one of the major concerns of LPCM. A part of the funding available at LPCM also comes from short (a few months) to middle (3 years) term industrial projects, some of which is used to hire PhD students.

f) **PlasMAC** (Ireland):

In April 2003 the Centre of Excellence (COE) for *Plasma Formation, Measurement and Control* (PlasMAC) was started in the National Centre for Plasma Science and Technology at Dublin City University. The PlasMAC centre will pursue the fundamental science and technology underpinning Model-Based-Control of Plasma-Surface-Treatment. Funding for PlasMAC adds 18 additional researchers across 5 research strands with academic direction and support from the Control-Systems-Group at NUI-Maynooth, and the Plasma-Research-Lab and Surface-Science-Lab at DCU, and direct support from Straatum, Lam Research, and Intel. Initially focused on semiconductor manufacturing, the control methodologies should be generically applicable to plasma surface processing.

g) **CAPST** (Korea):

In July, 2000 *the Center of Excellency for Advanced Plasma Surface Technology (CAPST)* was established at Sungkyunkwan University, Suwon by the MOST and KOSEF. The center is comprised of 3 major research groups with 15 professors and about 50 graduate students; design and synthesis of functional film, modeling and diagnostics of plasma, analysis and evaluation of film. The research projects are dedicated for design and synthesis of advanced tribological films such as nano-structured superhard composite film and super low friction lubrication films, and next generation functional films and processes for flat panel display such as nano-structured transparent film, ultra barrier film and low temperature film synthesis processes combined with development of advanced plasma sources and diagnostics. The funding is for a maximum 9 years with regular evaluation of every 3 years.

h) **CPS** (Netherlands):

In 1997 *the Research School Center for Plasma Physics and Radiation Technology (CPS)*, comprising of three groups at the University of Technology, one group at the Twente University and one group at the Nijmegen University and an association of the FOM-Institute on Plasma Physics in Rijnhuizen, was established by the approval by the Royal Netherlands Academy of Arts and Sciences for a period of five years. It was re-established after an internal peer-review evaluation in July 2002 for another five years. Total staff involved is about 30 (of which about 10 full-time professors), and about 50 PhD students and post-docs. Major research subjects are the Fundamentals of Technological Plasmas (including plasma deposition/etching/modification, plasma-surface interaction, lighting, dusty plasmas and plasma modelling), Atmospheric and Interstellar Plasmas and Plasma-wakefield Accelerators. The research school CPS is funded by Governmental Funding, National Science Foundation (NWO, STW, FOM) and industry.

Article 2

Instruments of Academic Exchange

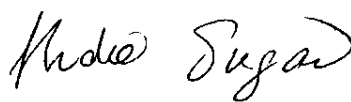



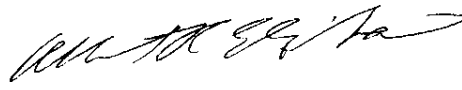
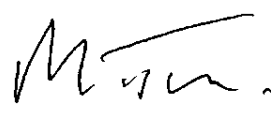

- a) The partners intend to foster the scientific exchange between their members by exchange of scientists and students and will support such activities within the frame of their individual organizational structures. Exchange of particular individuals within the academic exchange agreement has to be agreed on by the collaboration partners and the research groups involved.
- b) The partners intend to support a more intensified collaboration between the partner institutions by establishing joint research activities between their members.
- c) Information on scientific research will be exchanged freely provided such an exchange is not restricted by or is in conflict with other agreements or commercial interests.

- d) Detailed regulations and agreements on potential patent rights resulting from collaborative research and development will be setup and agreed on by all participating parties before a particular collaboration project becomes effective. These regulations should be in agreement with the local laws and already existing agreements and commitments of the partners.
- e) Joint seminars, symposia or workshops should provide a broader basis for exchange and considered as an essential instrument of collaboration.
- f) The partners will support one another on the development of their research activities in their countries and the development of the role of plasma science within society.
- g) The partners invite other COE's to join and participate in academic exchange here outlined.

Article 3
Final Clauses

- a) This agreement shall enter into force on April 1, 2004.
- b) This agreement will terminate to be effective, if one or more of the collaboration partners ceases to exist.
- c) All partners have the right to cancel this agreement at any time.
- d) This agreement may be amended by common agreement of the partners to this agreement.

Signatures

Plasma-Nano	Prof. H. Sugai	
SFB 591, CPST	Prof. Dr. U. Czarnetzki	
INP	Prof. Dr. K.-D. Weltmann	
LPCM	Prof. J.-P Landesman	
PlasMAC	Prof. A. Ellingboe	
	Prof. M. Turner	
CAPST	Prof. Dr. J. G. Han	
CPS	Prof. Dr. Ir. M.C.M. van de Sanden	