Appendix 1

V4–Japan Collaborative Research Projects

Project title	Country	Researcher	Position and Institution	Abstract of Research Project
New Generation of InGaN Layers, Quantum Wells and Wires Grown on Vicinal GaN Substrates for	Poland	Mike Leszczynski	Head of Epitaxy Lab Polish Academy of Sciences, Institute of High Pressure Physics	The project has a goal to develop a new generation of InGaN layers, quantum wells and wires which will have smaller defect density than the present state–of–the–art. The applications include next generation optoelectronics and photovoltaic devices. We are going to achieve this aim by control of In–segregation and mismatch defect formation. The control will be done using Unipress proprietary and patented technology for lateral patterning. At Nagoya University, by sequentially switching–on and –off indium precursors for nanorod growth and
	Japan	Hiroshi Amano	Professor Nagoya University, Director of Akasaki	

Optoelectronics and Photovoltaics			Research Center	unique raised-pressure MOVPE system, we will grow epi-structures with In-variable not only in vertical, but also horizontal directions. The structures will be examined especially using High Resolution X-ray Diffraction at Charles University. We are going to develop new XRD methods, in which we will include X-ray photon coherence, anomalous X-ray diffraction and interpretation not only of all peak positions, but also their intensities and the intensity of diffuse scattering between the diffraction maxima.
	Czech	Holy Vaclav	Professor Charles University in Prague, Department of Condensed Matter Physics	
	Czech	Jan Valenta	Professor Charles University in Prague, Faculty of Mathematics and Physics	The aim of the project is to develop new functional composite materials consisting of silicon nanocrystals and metal nanostructures. The goal is to demonstrate the potential of these materials in

Nanophotonics with Metal – Group-IV- Semiconductor Nanocomposites: from Single Nanoobjects to Functional Ensembles	Japan	Minoru Fujii	Professor Kobe University, Graduate School of Engineering	electronic devices and in biological applications. The Japanese team is responsible for the development of nanocomposite materials. The Czech team has two aims. The first one is to study the luminescence properties in single nanoobject spectroscopy. The other aim is to study the cytotoxicity and demonstrate the potential as fluorescence probes for bioimaging. The Hungarian and Slovakian teams perform theoretical research on nanocrystals and nanocomposites by different approaches. The Polish team is responsible for modeling and fabrication of nanocrystal-based electronic devices. Through the collaboration of these five teams, new silicon-based environmentally friendly nanocomposite materials can be
	Hungary	Ádám Gali	Research adviser, Research group leader, Hungarian Academy of Sciences,Wigner Research Centre for Physics	
	Slovakia	Ivan Štich	Chief scientist Slovak Academy of Sciences,Institute of Physics	
	Poland	Romuald Bartłomiej Beck	Professor Warsaw University of Technology, Institute of Microelectronics	

			and Optoelectronics	produced and their potentials in different fields demonstrated.
Structure–Function Relationship of Advanced Nanooxides for Energy Storage Devices	Japan	Hisao Suzuki	Professor Shizuoka University Research Institute of Electronics	The project aims at developing advanced all–solid type secondary batteries by investigating the relationship among powder properties, nanostructures of sintered ceramics and thin films, and their electrochemical properties. The Japanese team establishes a basic plan and optimizes processes for the cathode, anode and solid electrolyte, and evaluates the resulting secondary batteries. The Slovak team analyzes the nanostructures of powders, sintered ceramics and thin films. The Polish team prepares nanopowders for elecrodes and solid electrolyte, and optimizes the spark–plasma sintering. The Czech team evaluates the electrochemical
	Slovakia	Vladimír Šepelák	Professor Slovak Academy of Sciences, Institute of Geotechnics	
	Czech	Ladislav Kavan	Professor J. Heyrovsky Institute of Physical Chemistry, Department of Electrochemical Materials	
	Poland	Dariusz Oleszak	Associate Professor Warsaw University of Technology, Faculty	

			of Materials Science and Engineering	properties of nanopowders and the resultant secondary batteries.
Highly Safe GaN Metal-Oxide-Semiconductor Transistor Switch	Slovakia	Jan Kuzmik	Head of Department, Slovak Academy of Sciences,Institute of Electrical Engineering	By controlling interface states in MOS gate structures, the project will greatly improve the operation stability of GaN MOS high electron mobility transistors (HEMTs).
	Japan	Tamotsu Hashizume	Professor Hokkaido University, Research Center for Integrated Quantum Electronics	Specifically, the Japanese team will characterize MOS interface properties using a capacitance-voltage method with wide-range frequencies at high temperatures, and then develop an interface control technology. The Polish and Hungarian teams will address the analysis of interface defect levels by a rigorous numerical simulation and the structural analysis of MOS interfaces by a transmission electron microscope, respectively. Furthermore, the Slovakian team will
	Poland	Boguslawa Adamowicz	Associate Professor Head of Department Silesian University of Technology, Institute of Physics	

				fabricate and characterize GaN MOS-HEMTs based on an interface defect control process and a novel device structure. In this project, the complementary and functional collaboration will develop novel device technologies combined with interface control schemes, resulting in the GaN MOS-HEMT with high operation stability for next-generation power inverter systems.
	Hungary	Lajos Tóth	Senior Research Fellow Hungarian Academy of Sciences, Centre for Energy Research, Institute for Technical Physics and Materials Science (MFA)	
	Poland	Andrij Milenin	Professor AGH University of Science and Technology	The project aims to develop a multi-scale model of the laser dieless drawing process for hardly deformable magnesium alloys, and to fabricate magnesium alloy small tubes with high strength and ductility. The Japanese side conducts experiments of laser dieless drawing for hardly deformable magnesium alloy tubes. The Polish side develops a multi-scale model

Multi Scale Model of the Laser Dieless Drawing Process of Tubes from Hardly Deformable Magnesium Alloys	Japan	Tsuyoshi Furushima	Assistant Professor Tokyo Metropolitan University,Department of Mechanical Engineering	considering coupled heat and deformation analysis at macro-scale, and evolution of microstructure and surface roughness at the micro-scale of the laser dieless drawing. The Czech side conducts experimental observation of evolution of microstructure and surface roughness at micro-scale.
	Czech	Jiří Němeček	Associate Professor Czech Technical University in Prague, Faculty of Civil Engineering	Through this collaborative work, we optimize various forming factors from a cross sectional viewpoint from micro to macro scales in the laser dieless drawing process. By using this method, we fabricate magnesium alloy small tubes with high strength and ductility, and apply them to light weight structures in automobile and bioabsorbable materials.

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