

ADVANCED RESEARCH PROJECTS


■ Natural Sciences ■

Project Leader	Program Title	Program Overview
SATONAKA Shinobu , Graduate School of Science and Technology 	Project for Development and Processing of Advanced Magnesium Alloys	Based on the high performance magnesium alloys developed in Kumamoto University, we investigate the material design of new magnesium alloys and their processing, including casting, metallurgical and mechanical evaluation, cutting, forming, welding, inspection and recycling of materials. Research activities include joint researches with private companies, research institutes and universities in the domestic and Asian areas countries. This project is expected to be a research center for the development and application of new magnesium alloys.
KUBOTA Hiroshi , Shock Wave and Condensed Matter Research Center 	COE toward an Ultra-Large-Scale Integrated and Knowledge Based IT Industry	The next generation of semiconductor production requires the reduction of mask costs and speed in delivering complete masks. To offer solutions to difficult market needs (for instance, the mixture of digital and analog circuits), frequent trials of circuit correction under design alternation would let the mask reproduce in a short time, referred to as quick-turn-around-time (QTAT). We are introducing and realizing the newly developed computer aided lithography called reticle-free lithography and a nano-probing testing system for QTAT semiconductor production. The character of QTAT has been also been proven in application to academic experiments on chip construction.
OBARA Yuzo , Graduate School of Science and Technology 	Research and education center for application of X-ray CT to engineering materials	The X-EARTH Center (herein as <u>E</u> co, <u>A</u> qua, <u>R</u> esource and <u>T</u> ecHnology) is established for the research and the education through the X-ray CT methods applied to the various kinds of material. The researches performed in this center include many different research fields such as Geotechnical Engineering, Environmental Engineering, Mechanical Engineering, Material Science, Archaeology, Paleontology and so on, using industrial and micro-focus X-ray CT scanners at this center. Any researchers and students all over the world are possible to use this center and share the latest researches and technologies through the X-EARTH Community network. http://www.civil.kumamoto-u.ac.jp/x-earth/
MATSUMOTO Yasumichi , Graduate School of Science and Technology 	Hierarchical Organized Nanomaterials Based on Soft Wet Process	The project aims to open new fields in nano-science and technology to develop new devices such as sensors, catalysts, phosphors, electrodes, alloys, and polymers with hierarchical nano-hybrid structures. Almost of all the nano-hybrid materials are prepared by soft wet process. The research includes fabrication of ordered surfaces at atomic and molecular level, study on functions of nano-space in structures of molecules and materials, synthesis of nano-size and nano-structured materials etc. The education is carried out through the monthly group meeting together with invited world-leading scientists.
SHIMADA Jun , Graduate School of Science and Technology 	Frontier studies on sustainable utilization of water resources based on regional hydrological cycle	The global warming and the accelerated growth of the world population are proving a great menace for the sustainable water supply. The fresh water resource that we can use is very limited, so we have to understand the regional hydrological cycle and the capacity of water storage. To resolve the water environmental problems, the appreciate use of water resource, reduction of environmental loads, and preservation of the fresh water resource against the contamination are required. We will establish the new methodology target to Kumamoto area, and then new methodology will be adapted to the Southeast Asian and African countries
TAKIKAWA Kiyoshi , Center for Marine Environmental Study 	Foundation of a research and education center for advanced environmental science and technology for ecosystem protection, disaster prevention, and "life ware" formation around enclosed coastal areas.	The distribution and diversity of creatures and saltwater plants are important subject to the environments in the coast region. Main purposes of our studies are the explication of the interaction among environments in the atmosphere, seawater and sediment. These achievements lead to the new themes in our educations and researches that are related with the maintenance, disaster prevention and practical use to keep the harmonious environments in the coastal region.
YOSHIASA Akira , Graduate School of Science and Technology 	The Properties of Condensed Matter under Extreme Conditions and their Detailed Atomic Level Structural Analyses	Experimental and simulation studies are closely coordinated to investigate the structure of melts, and amorphous and crystal materials, under extreme conditions. The experiments are performed <i>in-situ</i> , using technologically advanced equipment such as Spring-8 synchrotron facilities. The project aims at the construction of a theory that links nanoscale structures and macroscopic properties, the visualization of electronic structures by simulation, and the textures and history of multi-element and multi-phase structures such as the Earth's interior.


Life Sciences

Project Leader	Program Title	Program Overview
TERASAWA Hiroaki , Faculty of Medical and Pharmaceutical Sciences 	"Made in Kumamoto University"- initiating ground-breaking drug discovery research	We carry out collaborative research with the intent to develop new treatments such as anti-inflammatory drugs without side effects, drugs for dysuria, anticancer drugs, and artificial blood, and to establish the foundation for a drug discovery research center.
NAKAGAWA Kazuko , Faculty of Medical and Pharmaceutical Sciences 	Leading project for individualized medicine at the Center for Clinical Pharmaceutical Sciences	In April 2008, Kumamoto University established The Center for Clinical Pharmaceutical Sciences (CCPS) in its School of Pharmacy. The objectives of the CCPS are 1) continuing professional education for pharmacists, 2) providing practical training in pharmaceutical care for undergraduate and graduate students, 3) developing personalized medicine, and 4) providing evidence-based health information. This project aims to put personalized medicine into practice, especially targeting Asians. The specific projects are 1) personalized health plans based on the risk stratification as determined by the combination of a few susceptibility alleles, 2) personalized drug therapy, focusing on high risk patients, e.g. neonates, and 3) the development of new diagnostic/monitoring systems.
YAMAMURA Ken-ichi , Institute of Molecular Embryology and Genetics 	Application of Genetically Engineered Mice to Intractable Disease Medicine	In this project, we aim to (1) produce transgenic mouse models for human diseases, (2) analyze the pathophysiology of disease development, and (3) devise new methods of treatment for animal models and human patients. To accomplish these goals, we divided members into 5 groups, the skin group, lung group, dystrophy group, cancer group, and mouse group.
TAKEYA Motohiro , Faculty of Medical and Pharmaceutical Sciences 	Center for Frontier Research on Life Style and Stress Signal	Bioradical stress induces serious vascular diseases and various metabolic disorders, including diabetes mellitus, atherosclerosis, hypertension and metabolic syndrome. The aim of our project is to illuminate the deeply hidden mechanism of vascular injury and to develop new therapeutic strategies to prevent metabolic vascular insults.
ARAKI Norie , Graduate School of Medical Sciences 	Development of a Research and Educational System for Systems Biology based on Disease Proteomics, a New Field of Bioscience in the Post-Genomic Era	In our project, we aim to establish an advanced research and educational system for systems biology based on disease proteomics, the most important bioscientific field in the post-genomic era. With the completion of the highly-resourced research lab in the new facility of the medical campus, equipped with advanced analysis instruments such as multi-type of high-throughput tandem mass spectrometers, advanced bioinformatics software and large databases, it is now possible to conduct a high level of medical research backed by the world level of advanced knowledge and technologies of systems biology based on proteomics. Unique lectures and seminars on systems biology have been attracting the attention of students and young scientists. Our project has successfully introduced the most advanced system for systems biology based on proteomics research and education in Kumamoto University. Presently, unique research projects, which seek to make new findings that are useful for drug discovery, are being promoted with the collaboration of researchers from several fields.

Cultural and Social Sciences

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YOSHIMURA Toyoo , Faculty of Letters 	World Cultural Resources Collection and Construction of Historical Cultural Resources Study	This research project was launched to screen accumulated worldwide and local resources, and particularly the eiseibunko, or Hosokawa Manuscript collection, which is preserved at Kumamoto University and is the largest collection of primary source materials on the administration of the Hosokawa government. The materials will be reviewed through systematic discussion in the various fields of Humanities, including Historical Science, Archaeology, Folklore, Linguistics, and Japanese Literature, to organize the collections as a research resource in the field of Japanese Studies.

Interdisciplinary, Combined Fields, New Disciplines

Project Leader	Program Title	Program Overview
TAKAHASHI Takao , Graduate School of Social and Cultural Sciences 	Construction of 21 st Century Future Generation Studies	The project aims to construct interdisciplinary science of Future Generation studies, which responds to the tasks concerning future generations such as reorganization of ethical norms, consensus formation, and sustainable systems of healthcare, welfare, local communities.