GCOE CEDI
Osaka Univ.

Osaka University
Global Center of Excellence Program

Center for Electronic Devices Innovation

Division of
Electrical, Electronic and Information Engineering,
Graduate School of Engineering, Osaka University

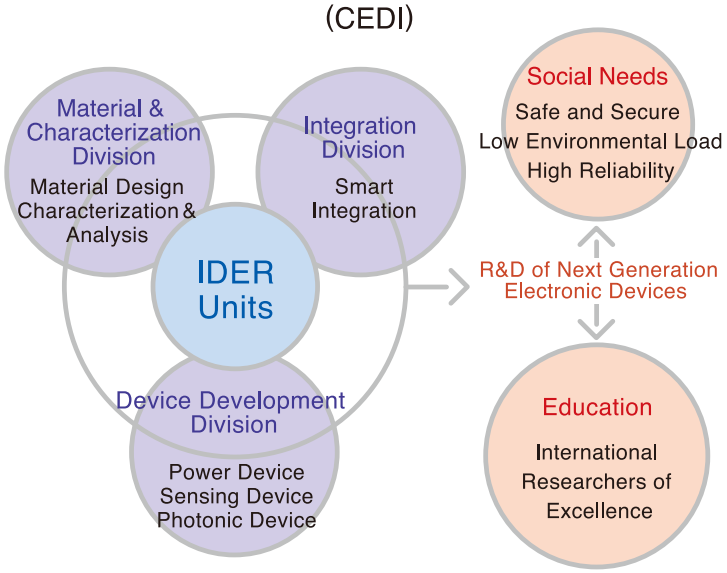
Electronic Devices Innovation with Prominent Research Seeds and New Education Platform

Outline

The primary goal of CEDI is to establish an outstanding system for R&D and education in the area of next-generation electronic devices. Next-generation electronic devices for a ubiquitous society are required to be extremely small, light-weight, and have a low power consumption, but yet must have a large storage capacity and a high-processing speed. Essential requirements include a high efficiency with a low environmental impact and a high reliability for a safe, secure and dependable society. Thus, it is essential to create epoch-making materials that go beyond conventional concepts and novel process technologies that surpass the limitations of the existing semiconductor micro-fabrication.

A new research and education platform, Innovation-oriented Dynamic Education and Research (IDER) units, was built to promote cross-disciplinary/university-industry/international collaborations without organizational and disciplinary barriers. Based on our novel and various research seeds, young researchers from different laboratories have organized their IDER units to develop advanced electronic devices along the strategic goals of CEDI.

Center for Electronic Devices Innovation (CEDI)



Research Activities

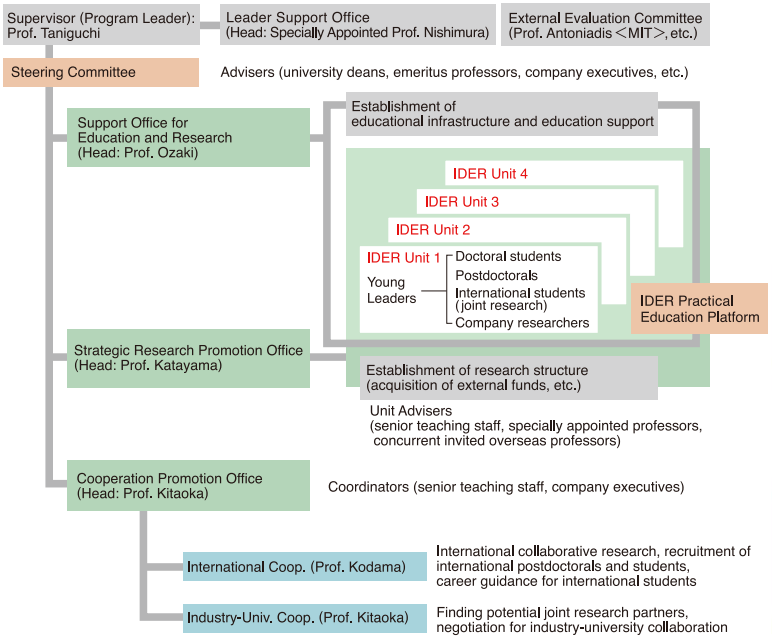
The operational structure of CEDI consists of three offices, "Support office for Education and Research," "Strategic research promotion office" and "Cooperation promotion office" as shown in the figure. The Strategic Research Promotion Office and the Support Office for Education and Research have been created to establish and support the research structure and educational infrastructure at IDER units. The Offices also arrange for smooth cooperation and collaboration among participating members.
The Cooperation Promotion Office designed to support cross-disciplinary/university-industry/international collaborations has been established.

CEDI aims to develop the following devices:

(1) high-efficiency power devices for an environment-friendly society;
(2) smart sensing devices for a safe and secure society;
(3) high speed quantum photonic devices for a highly reliable society.

To develop such devices, we have established three strategic divisions, "power devices," "sensing devices" and "photonic devices" which are supported by three support divisions, "material design," "characterization and analysis," and "device integration." These strategic and support divisions work in close cooperation to promote development of the devices.

Operational Structure



Operation Concept

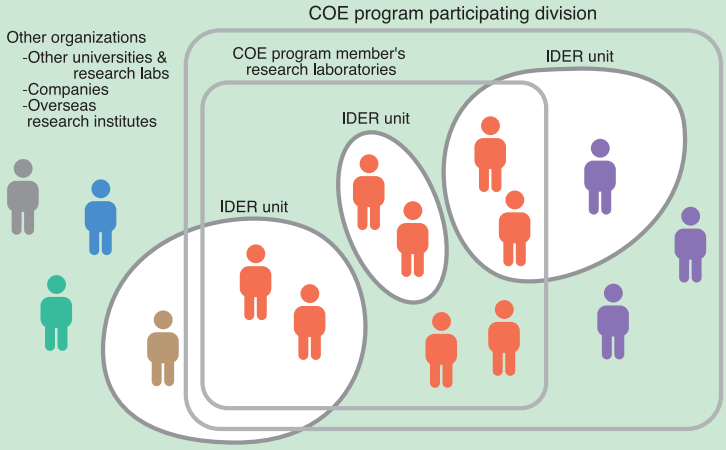
	Material Design Division (Chief : Prof. Ozaki)	Characterization and Analysis Division (Chief : Assoc. Prof. Mori)	Device Integration Division (Chief : Prof. Taniguchi)
	-Prof. Ozaki Organic materials		
	-Prof. Ohmori Flexible device materials	-Assoc. Prof. Mori Device simulation	-Prof. Taniguchi Device integration
	-Prof. Kitaoka High quality crystal growth	-Assoc. Prof. Abe Ultimate characterization	-Assoc. Prof. Matsuoka Device integration
	-Assoc. Prof. Yoshimura High quality crystal growth		
Power Device Division (Chief : Prof. Ise)	-Prof. Ise -Prof. Ito -Prof. Kuzuhara	High efficient devices Semiconductor power devices GaN power devices	
Sensing Device Division (Chief : Prof. Katayama)	-Prof. Katayama -Prof. Sugino -Assist. Prof. Okuno -Prof. Tonouchi -Prof. Itozaki -Prof. Nagatsuma	CNT gas sensing devices Semiconductor bio-sensing devices Bio-sensing THz imaging sensing devices Superconductor magnetic sensing devices THz imaging	
Photonic Device Division (Chief : Prof. Kodama)	-Prof. Kodama -Prof. Kitayama -Prof. Inoue -Prof. Suhara -Prof. Kondow -Prof. Okamura	Plasma photonic devices Photonic network devices Quantum photonic devices Integrated quantum photonic devices Next-generation laser devices Optoelectronics	

Education Program with the IDER Units

IDER:
Innovation-oriented Dynamic Education and Research

Organizational Structure of the IDER Unit

The IDER unit is a new education and research platform, generally consisting of young researchers, including academic staff, postdoctoral researchers and doctoral students, from two or more laboratories of COE program members. Some IDER units are established specifically for collaborations with other institutions, companies and overseas organizations.



<Example of organizational structure of IDER unit>

We have built IDER units according to the following policies.

1. Each unit must clearly define its strategic R&D goals.
2. Complementary and cross-disciplinary collaboration units, which involve various research organizations in Japan and abroad with their developed own technologies, must be formed.
3. The unit structure must be dynamically reinforced in response to the past development of research activities.
4. The unit must provide a venue for young researchers to conduct independent activities.

Development of next-generation electronic devices

Prominent research seeds

Incubation Stage (organizing IDER)

Scrap-and-build Stage (reconstruction)

Innovation Stage (promoting innovation)

Safe and Secure
Low Environmental Load
High Reliability

Society

Fostering young researchers who can organize a project to develop electronic devices

Wide variety of attractive educational programs

- Doctoral programs for global electronic device experts
  - "Academic Melting-Pot"
  - Electronic device expert fostering program "Meister Program"
- Enhancing human skills of young teaching staff
  - "Academia-Industry Exchange Program"
- Adult education and doctoral course for working people
  - "Remedial Electronics Course for Working People"
- Education program for promoting interdisciplinary cooperation
  - "Education Program for Management of Technology (MOT)"
  - "Silicon-Philosophy Education"

International Researchers of Excellence

Global COE Program

As part of government's effort to reform the universities, in 2007 Ministry of Education, Culture, Sports, Science and Technology (MEXT) established a new "Global COE Program" to create centers of education and research excellence of the world's highest order, which will work to dramatically strengthen the university's function of educating young researchers capable of playing active roles at international settings. Osaka University Global COE CEDI is one of the COEs selected in the field of information sciences, electrical and electronic sciences.

Message

Welcome to the Center for Electronic Devices Innovation (CEDI)

Prof. Kenji Taniguchi, Program Leader
Division of Electrical, Electronic and Information Engineering (EEIE),
Graduate School of Engineering, Osaka University

The mission of CEDI at Osaka University is to perform education and research/development based on practical science that will:

1) provide opportunities to carry out R&D in three device categories such as power, sensor and photonic devices for a "safe and comfortable," "low environmental load," and "highly reliable" society in the future.
2) provide the training for PhD course students as well as young researchers to successfully pursue a rewarding career in academia and industries, and
3) contribute strongly to advancements in electronic devices by using new materials, computer simulation and smart integration technologies.

A new research and education platform including Innovation-oriented Dynamic Education and Research (IDER) units was built to promote cross-disciplinary/university-industry/international collaborations without organizational and disciplinary barriers. Based on our novel and various research seeds, young researchers from different laboratories have organized their IDER units to develop advanced electronic devices along the strategic goals of CEDI.

CEDI was founded at Osaka University as a center of excellence (COE) through a new "Global COE program" initiated by Ministry of Education, Culture, Sports, Science and Technology (MEXT) in 2007.

Program Members

<Device Integration Division>

Chief	Kenji TANIGUCHI	EEIE, Graduate School of Engineering, Professor
	Toshimasa MATSUOKA	EEIE, Graduate School of Engineering, Assoc. Professor

<Material Design Division>

Chief	Masanori OZAKI	EEIE, Graduate School of Engineering, Professor
	Masashi YOSHIMURA	EEIE, Graduate School of Engineering, Assoc. Professor
	Yutaka OHMORI	Center for Advanced Science and Innovation, Professor
	Yasuo KITAOKA	Frontier Research Center, Graduate School of Engineering, Professor

<Characterization and Analysis Division>

Chief	Nobuya MORI	EEIE, Graduate School of Engineering, Assoc. Professor
	Masayuki ABE	EEIE, Graduate School of Engineering, Assoc. Professor

<Power Device Division>

Chief	Toshifumi ISE	EEIE, Graduate School of Engineering, Professor
	Toshimichi ITO	EEIE, Graduate School of Engineering, Professor
	Masaaki KUZUHARA	Electrical and Electronics Engineering, Graduate School of Engineering, Fukui University, Professor

<Sensing Device Division>

Chief	Mitsuhiro KATAYAMA	EEIE, Graduate School of Engineering, Professor
	Takashi SUGINO	EEIE, Graduate School of Engineering, Professor
	Hirotsugu OKUNO	EEIE, Graduate School of Engineering, Assist. Professor
	Hideo ITOZAKI	Department of System Innovation, Graduate School of Engineering Science, Professor
	Tadao NAGATSUMA	Department of System Innovation, Graduate School of Engineering Science, Professor
	Masayoshi TONOUCHI	Institute of Laser Engineering, Professor

<Photonic Device Division>

Chief	Ryosuke KODAMA	EEIE, Graduate School of Engineering, Professor
	Ken-ichi KITAYAMA	EEIE, Graduate School of Engineering, Professor
	Kyo INOUE	EEIE, Graduate School of Engineering, Professor
	Toshiaki SUHARA	EEIE, Graduate School of Engineering, Professor
	Masahiko KONDOW	EEIE, Graduate School of Engineering, Professor
	Yasuyuki OKAMURA	Department of System Innovation, Graduate School of Engineering Science, Professor

Contact

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