



Graduate School of
Analytical Science and Technology

GRAST

GRAST, Chungnam National University, Daehak-ro 99, Yuseong-gu, Daejeon
<http://grast.cnu.ac.kr>
grast@cnu.ac.kr



Read the GRAST brochure
on your smartphone.

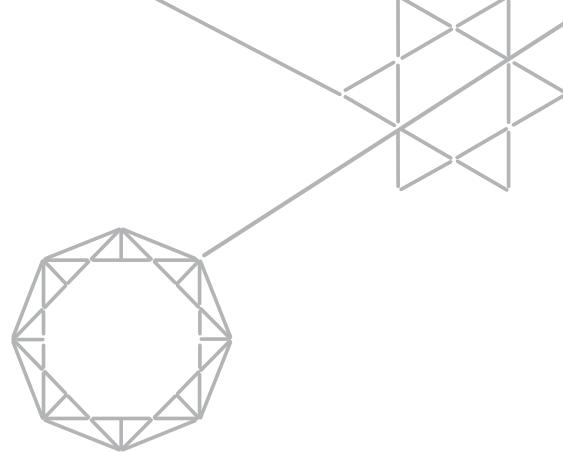
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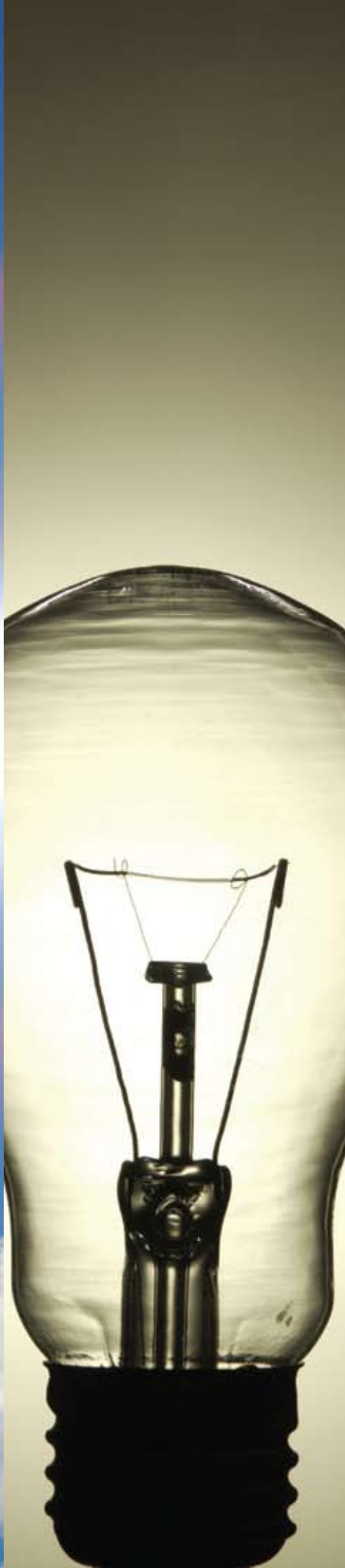
Graduate School of
Analytical Science and Technology

GRAST CNU KSI



Analytical Science and Technology

- Analytical science and technology is an interdisciplinary field that covers applied technology, analytical instrument design, and experimental method development. The development of new analytical equipments signifies the process of the advancement in analytical equipments and relevant systematical software, which are complied with the demand of the leading edge of science and technology.



GRAST

Graduate School of
Analytical
Science and
Technology



GRAST Dean's Message

Greetings,

As the dean of the Graduate School of Analytical Science and Technology (GRAST), it gives me great pleasure to welcome you.

What is GRAST?

GRAST formed as a partnership between Chungnam National University and the Korea Basic Science Institute (KBSI), a government-sponsored research institute. The intent was to form a strong and mutually beneficial bond between research and education. GRAST has become a world-class graduate school that features a unique combination of science and technology disciplines, which includes biology, physics, chemistry, forensic science, materials engineering, chemical engineering and electrical engineering. We have successfully broken down the barriers between these various departments in order to create an environment conducive to synergistic scientific discovery. Yes, GRAST is an exciting place!

Why is departmental convergence important?

We strongly believe that convergence leads to creativity. Creativity coupled with curiosity is the key to scientific breakthroughs that enhance the quality of human life through the better understanding of our natural world. We want our students, researchers, and faculty to work together as one. Always remember - All of us are smarter than one of us. By working diligently with our hearts and minds we are definitely destined to do great things together. Yes, we will achieve greatness!

What is important to us?

We are committed to giving you the best equipment, guidance, and instruction that we possibly can. We want you to succeed. We expect you to give your best effort, maintain the highest level of academic integrity, and to help each other.

We can and will operate at the Nobel Prize level in science. Yes, together we can do it!

Here, I invite all of you, future scientists and engineers to dream big, to make new discoveries, and to create a bright future for you, for Korea, and for humanity.

Sincerely,

Heesun Chung,
Dean of the Graduate School of Analytical Science and Technology
at Chungnam National University.

DEAN of GRAST



GRAST Only One, Number One!

Only One

The only graduate school which is specialized in analytical science and technology in the world.

Number One

GRAST aims the top graduate school of analytical science and technology in the world.

The first successful cooperational graduate school supported by university and government research institute in Korea.



History

Bridge between the university and the government-funded research institute.

- 2014. 02. 12 Signed an MOU with BTI A*star of Singapore
- 2013. 07. 29 Signed an MOU with University of Rochester
- 2013. 04. 04 Signed an MOU with National University of Singapore
- 2013. 03. 25 Signed an MOU with Agilent Technologies
Opened "GRAST-Agilent academy-industry cooperation"
- 2012. 03. 01 Entered the 2nd phase of "University-Institute cooperation program"
- 2011. 12. 22 Signed an MOU with the Korea Advanced Instruments Manufacturers Association
- 2011. 11. 09 Signed an MOU with the Korea Institute of Geoscience and Mineral Resources
- 2011. 08. 23 Established the AGRS
- 2011. 02. 25 Graduated the first GRAST graduates (12)
- 2009. 03. 01 Opened the Graduate School of Analytical Science and Technology
Initiated the 1st phase of "University-Institute cooperation program"
- 2008. 10. 22 Approved the opening of the Graduate School of Analytical Science and Technology
- 2008. 07. 01 Signed an MOU to establish the Graduate School of Analytical Science and Technology
- 2008. 04. 30 Found the joint committee between Chungnam National University and the Korea Basic Science Institute



Qualified experts in Analytical Science

Analytical Science Researcher

Skilled operators with master degree, who have thorough understanding in mechanism of the analytical equipments and are able to analyze data as well.

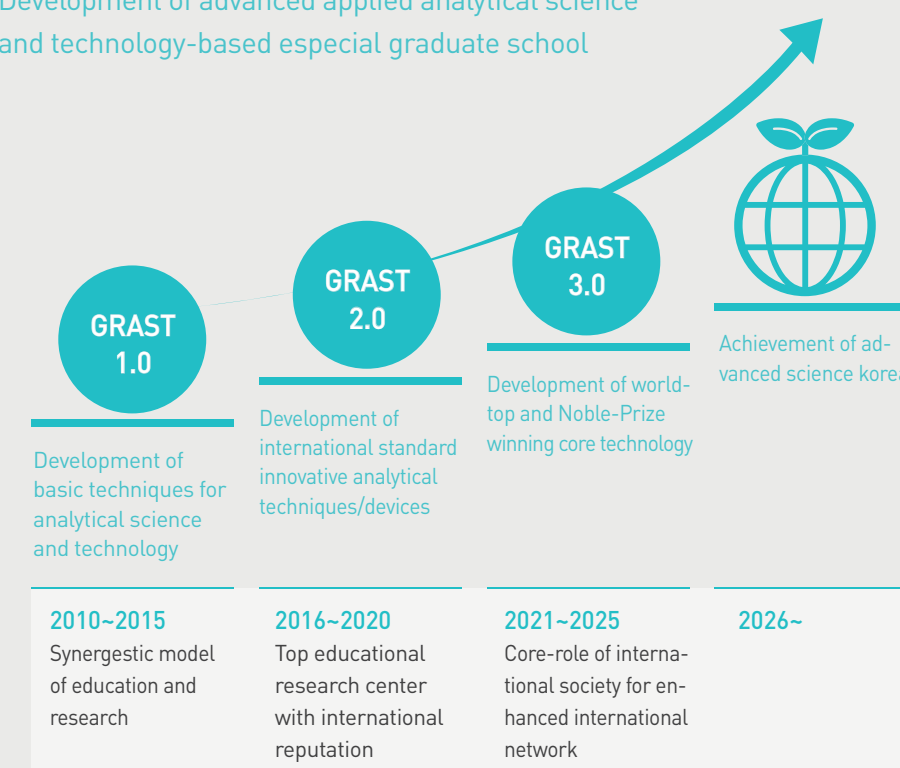
Analytical Science Professional Researcher

Advanced skilled operators with doctoral degree, who can draw unprecedented forms of use and operational principle in line with thorough understanding in mechanism and analysis of data.



Vision

Development of advanced applied analytical science and technology-based especial graduate school



Vision

The world-leading graduate schools in analytical science and technology challenging the Nobel Prize

Mission

- Educate and prepare the next generation of young analytical scientists and researchers
- Develop the fundamental technologies and analytical equipment leading the world
- Establish the successful cooperation for industry, research institute and university

Strategy

- Develop analytical technologies and methodologies that advance the frontiers of nanotechnology, biotechnology, and environmental technology
- By combining a solid theoretical grounding with practical, hands-on experience, we provide today's bright, young analytical minds with the knowledge and expertise necessary to handle the challenges of tomorrow
- By fostering collaborations across labs, universities, disciplines, and borders, GRAST has become a global hub for analytical science and technology



GRAST

Analytical science and technology challenges the boundaries of science, creating new connections and bridging the gaps between the basic scientific disciplines.



Education

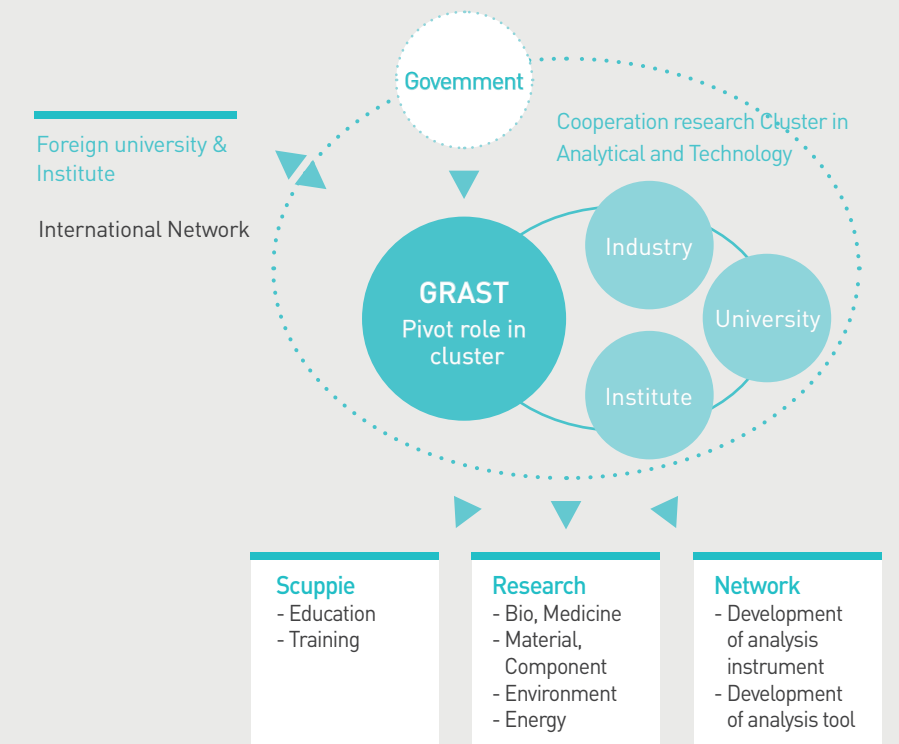
Theoretical and experimental Classes based on practical aspects

1. Specialize analytical science and technology
 - Lectures on the common basics on the analytical science and experiments
 - Open in-depth courses on the special analytical science and technology
2. Joint education system of the academy and the research institute
 - The joint professor system in the academy and research institute
 - Large-scale research projects using national large-scale research equipment.

Occupation and scholarship

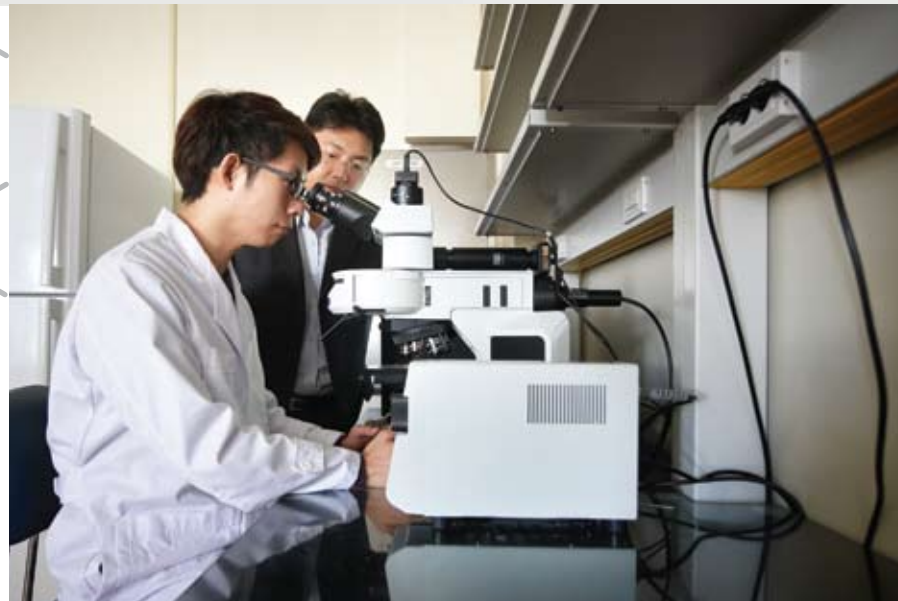
- Provide the nation-best scholarship and dormitories if needed
- Excellent students are scouted by Chungnam National University and the Korea Basic Science Institute
- Provide site research credit system by the internship in the research sites of the sponsored research institutes and companies

International Hub in Analytical Science and Technology



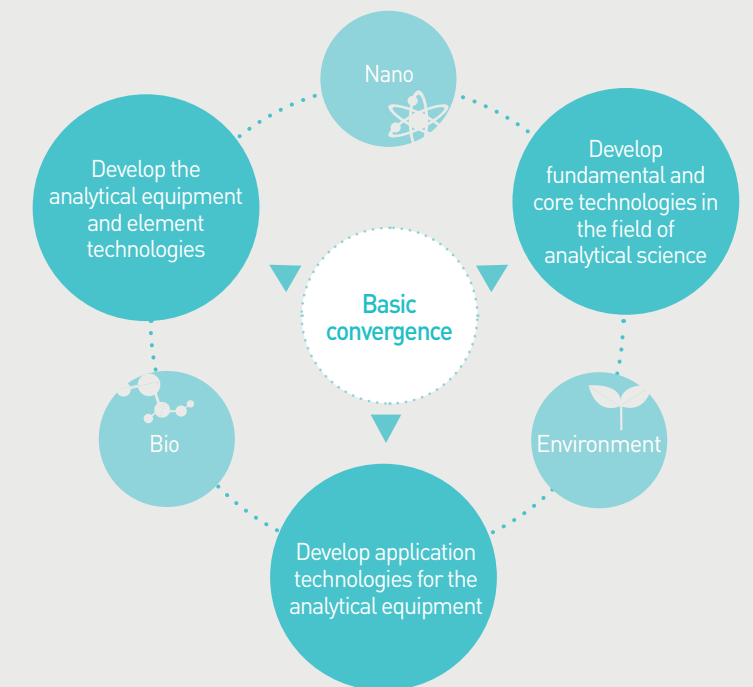
GRAST

Leading South Korea to enter the world's top10th research and education center in the field of Analytical Science



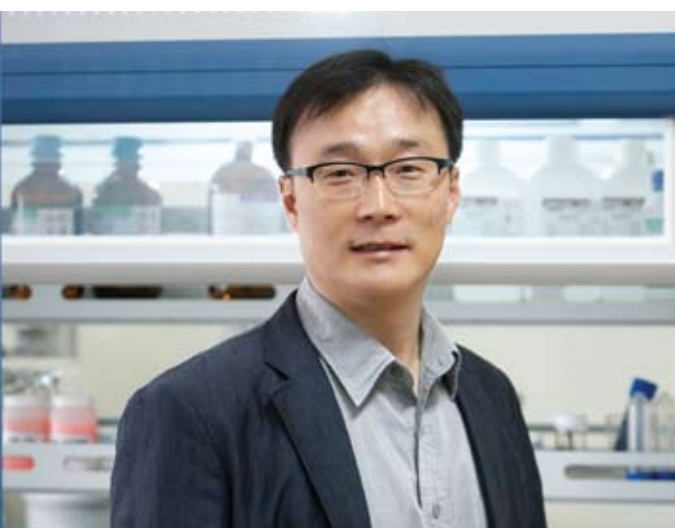
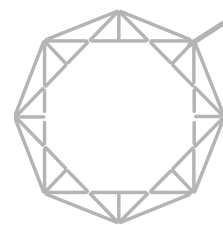
Research Areas

GRAST aims at developing core technology of the analytical science and analytical equipments. We develop analytical technologies and methodologies that advance the frontiers of nanotechnology, biotechnology, and environmental technology.



Faculty

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2 1

- 1 Professor Aminur Rahman, an excellent scientist in the field of the electrochemistry
marahman@cnu.ac.kr / +82-42.821.8546
- 2 Professor Hyun Joo Ah, a leading researcher in the sugar analysis
hjan@cnu.ac.kr / +82-42.821.8547

3 4
5


- 3 Professor Chan Pil Park, an expert in the microchemistry
chan@cnu.ac.kr / +82-42.821.8549
- 4 Professor Joo-Yong Lee, a molecular cell biologist studying the aging of the life
leejooyong@cnu.ac.kr / +82-42.821.8559
- 5 Professor Eunji Lee, a rising star in the development of nano materials
eunjilee@cnu.ac.kr / +82-42.821.8557

- Faculties with competitive edge and capabilities for the future of students


The faculty members nurture human resources and develop the future.



Faculty joining professor




Professor
Noh Jae Lang
Immunology
+82.42.821.6420
CNU




Professor
Joon Sig Choi
Genetic biochemistry and nano-biochemistry
+82.42.821.5489
CNU

Fundamental technology research



Professor
Chang Sik Cheong
Radiogenic isotope earth science and dating science
+82.42.865.3446
KBSI



Professor
Young-Ho Chung
Proteomics and Cell Biology
+82.42.865.3429
KBSI

Analytical technology and equipment development research



Professor
Oc Hee Han
Chemistry and solid NMR spectroscopy
+82.53.950.7912
KBSI



Professor
Youn Joong Kim
Electromicroscopy and crystallography
+82.42.865.3596
KBSI




Professor
Geon Hee Kim
Ultra-precision processing equipment and measurement assessment equipment development
+82.42.865.3460
KBSI




Professor
Ki Ju Yee
Pemto-second laser spectroscopy
+82.42.821.6540
CNU

Application technology research



Professor
Jong Shin Yoo
Mass analysis
+82.43.240.5150
KBSI



Professor
Geum Sook Hwang
Metabolomics and natural material
+82.2.920.0737
KBSI



Professor
Jong Soon Choi
Functional proteome
+82.42.865.3428
KBSI




Professor
Kwan Soo Hong
Nano-contrast medium synthesis and MRI application
+82.43.240.5100
KBSI



Professor
Young Mok Park
Proteomics
+82.43.240.5160
KBSI



Professor
Kwang Sik Lee
Isotope earth science and isotope studies
+82.42.865.3447
KBSI



Professor
Young Hwan Kim
Mass spectrometry and Bioanalytical chemistry
+82.43.240.5140
KBSI

GRAST adjunct faculty (International and academy-industry cooperation)



Professor
Rudolf Grimm
Mass analysis
Incumbent director of Agilent Technologies (US)



● GRAST opens a new way of science and technology by strengthening joint studies with universities and sponsored research institutes

Joint research cluster with dream and efforts



Collaborative Research

| Joint research | Responsible researcher |
|---|------------------------|
| Lab-on-a-chip-based multi-channel spectroscopic imaging system development and application | Keon Hee Kim KBSI |
| Develop the cutting-edge proteomanalysis technology to discover specific protein related to the degenerative brain diseases | Young Mok Park KBSI |
| Develop the bio-information handling technology to effectively analyze the glycosylation of mass analysis-based bio-medical products and the data | Hyun Joo Ahn GRAST |
| Develop the distinguish methods of food and timber and their origin | Gwang Sik Lee KBSI |
| Manufacture the intelligent drug and genetic transmitter using the self-assemble technologies of the artificial peptide and develop the hierarchical structure analysis at the molecule - nano - micro - level analysis | Eunji Lee GRAST |
| Develop and apply the functional aging proteomics analysis technology | Jong Soon Choi KBSI |
| Develop the analysis technology of high resolution - MRI / high sensitivity - IR molecule imaging | Gwan Su Hong KBSI |



International Collaboration

Status of signing MOUs with world-renowned universities

| Date | Participating organization | Region | Remarks |
|----------|---|-----------------------------|---|
| 2010. 07 | Univ. of California, Davis, Dept. of Chemistry | US | · Academic data exchange · Joint research · Hold symposium |
| 2010. 07 | Northeastern Univ. Dept. of Chemistry & Chemical Biology | US | · Technical cooperation · Exchange master's and doctor's courses · Joint research projects |
| 2010. 09 | Eberhard Karls University Tubingen | Germany | · Faculty exchange · Student exchange · Joint research · Exchange student |
| 2011. 06 | European Graduate School of Neuroscience | Europe (17 universities) | · Technical cooperation · Exchange master's and doctor's courses · Joint research projects |
| 2013. 04 | National University of Singapore (NUS) | Singapore | · Technical cooperation, student exchange · Joint research projects · Academic exchange · Industry-academy cooperation and support |
| 2013. 07 | University of Rochester | US | · Student exchange · Joint research projects · Academic exchange |
| 2014. 02 | BTI A*star of Singapore (Bioprocessing Technology Institute) | Singapore | · research collaboration · Joint conference & workshop · Signed an MOU for personal exchange |

Status of signing MOUs with global analytical equipment companies

| Date | Participating organization | Region | Remarks |
|----------|--------------------------------------|------------|---|
| 2011. 08 | Agilent Technologies (signed MOU) | US | · Equipment and software support · Joint study support · Agilent training support |
| 2011. 08 | Asia Glycomics Reference Site (AGRS) | US / Korea | · Train glycomic human resources in Asia and research |
| 2011. 11 | Bruker (signed MOU) | Germany | · Joint study support · Training and research equipment support · Training and education |
| 2013. 03 | Agilent Technologies (signed MOU) | US | · Donate the equipment for the research and education · Agilent training support · Perform joint projects |



- Workshops and short courses for students
- Short-term visit to learn new methods and to perform short experiments
- Credit exchange program
- Language course

Status of signing MOUs with world-renowned universities

- 1 Univ of California, Davis. USA
- 2 Northeastern Univ. USA
- 3 Eberhard Karls University Tubingen. Germany
- 4 Maastricht University. Netherlands
- 5 National University of Singapore. Singapore
- 6 University of Rochester. USA

Status of signing MOUs with global analytical equipment companies

- 1 Agilent Technologies. USA
- 2 Bruker. Germany

International Personnel Exchanges

Overseas training for GRAST students

| Date | Exchange organization | Purpose |
|---------------------|--|--|
| 2010. 09 ~ 2010. 10 | UC Davis (US) | International joint research project between GRAST and UC DAVIS graduate school [Joint research on the glyco-protein analysis DB and program] |
| 2011. 01 ~ 2011. 03 | Jožef Stefan Institute (Slovenia) | Overseas training to Jožef Stefan Institute (joint research) [Visiting study for research cooperation and human resources exchange] |
| 2011. 01 ~ 2011. 03 | Lille University (France) | Train and education to perform international joint research projects "Role of the epigenetics in the aging and the degenerative brain diseases" |
| 2011. 04 ~ 2011. 08 | Maastricht University (The Netherlands) | Train and education to perform international joint research projects "Role of the epigenetics in the aging and the degenerative brain diseases" |
| 2012. 01 | UC Davis (US) | Discover the biomarker and joint study on the cancer cell indicator using the Glycomics |
| 2012. 02 ~ 2012. 04 | Bochum (Germany) | Discover the biomarker and joint study on the cancer cell indicator using the Glycomics |
| 2012. 08 ~ 2012. 10 | Wurzburg Univ. (Germany) of Sao Paulo (Brazil) | Joint study on the proteom analysis using brain neurons |

Visiting foreign researchers to GRAST

| Date | Exchange organization | Purpose |
|---------------------|--|--|
| 2011. 08 ~ 2011. 10 | UC Davis (US) | Joint study on the glycomics |
| 2012. 08 ~ 2013. 07 | UC Davis (US) | Study the glycomics (Post. Doc course) |
| 2012. 08 ~ 2012. 09 | Eberhard Karls University Tubingen (Germany) | Train undergraduate students in Eberhard Karls University Tubingen |
| 2012. 08 ~ 2012. 10 | Eberhard Karls University Tubingen (Germany) | Visiting study in GRAST for the heat generation study from the cellular mitochondria |
| 2013.02 ~ 2013.07 | UC Davis (US) | Study the glycomics (Post. Doc course) |



Global Industrial-Educational Collaboration

Site survey performance through visiting relevant companies in Korea and overseas

| Date | Organization | Region | Remarks |
|----------|--|-----------------------|--|
| 2010. 08 | Hanmi Pharmaceutical Research Center · Synthetic new drug research · Bio new drug research | Dongtan, Gyeonggi | Visiting the center |
| | Central research institute at Korea United Pharmacy · Modified new drugs, synthesized new drug study · BT R&D | Jochiwon, Chungnam | Visiting the center |
| 2010. 12 | Younglin Equipment · HPLC, GC, ICP-MS device development · Manufacture pure / ultra-pure devices Lab Frontier Co., Ltd. · Environment / living safety analysis service | Anyang, Gyeonggi | Visiting the center |
| | KMAC, CHCLAB · Develop the FPD / semi-conductor inspection devices · Develop the bio / medical diagnosis / lab analysis devices | Daejeon | Visiting the center |
| 2011. 01 | LG Chemical Research Park · CRD, information electronic materials · Battery, petroleum chemistry | Daejeon | Visiting the center |
| 2011. 11 | Visiting small-and medium-sized companies in Daejeon · CHC, LAB, KMAC, MicoBioMed, etc. | Daejeon | Visiting the center |
| 2012. 02 | JEOL · Join and visit JEOL technical program and training | Japan | Join the seminar, lab demo and model classes for the inter- national exchange |
| | Relevant organizations in Seoul and Gyeonggi · Gyeonggi Bio Center, nano-specific labs, Bruker | Bundang, Dongsuwon | Lectures on the equipment for the environment, bio and nanoanalysis and visit the demo lab |
| | Singapore biopolis · Bruker (global analytical equipment company) · ABSceix (global analytical equipment company) Bioimaging Lab · BTI (BioTechnology Institute) National University of Singapore | Singapore | Join the seminar, lab demo and model classes for the inter- national exchange |

| Date | Organization | Region | Remarks |
|----------|--|-----------|---|
| 2013. 04 | Singapore biopolis Visit the BTI (BioTechnology Institute) Astar · Agilent factory (Mass spectrometer and other production facilities) · Lipidomics center National University of Singapore | Singapore | Visiting the laboratories and signed an MOU for international exchange |
| 2013. 08 | JEOL · Join and visit JEOL technical program (NMR, TEM) | Japan | Join the seminar, lab demo and model class- es for the international exchange |
| 2014. 01 | NTS (National Forensic Service), Samsung Electronics Co., Ltd. , NONGSHIM CO., LTD. | Gumi | Visiting relevant com- panies and research installation of field of analytical science |
| 2014. 02 | Singapore Biopolis · BTI (BioTechnology Institute) Astar · HSA(Health Sciences Authority) · National Metrology Centre, Singapore · Agilent factory | Singapore | Visiting the laboratories and signed an MOU for international exchange |

Cooperation with the local research institutes and analytical equipment companies

| Date | Organization | Region | Remarks |
|----------|---|---------|---------------|
| 2011. 11 | Korea Institute of Geoscience and Mineral Resources · Joint research, human resources exchange and use of facilities and equipment · Joint use of academic and technical information | Daejeon | Signed an MOU |
| 2011. 12 | Korea Advanced Instruments Manufacturers Association (KAIMA) · Exchange human resources and jointly host aca- demic seminars and special lectures · Donate and train demo equipment | Daejeon | Signed an MOU |
| 2012. 12 | KMAC Co., Ltd. · Operate the contract department | Daejeon | Signed an MOU |



Nobel Prize in Analytical Science & Technology

Nobel laureates on representing analytical technologies and equipment development

| | | |
|------|---|---|
| 2009 | · Semiconductor circuit for imaging - CCD center - invention and develop optical communication technologies using optical fibers | Charles Kuen Kao (China) Willard S. Boyle (Canada) George E. Smith (US) |
| 2007 | · Started developing the surface chemistry discover and develop the surface phenomena at the atomic level and application | Gerhard Ertl (Germany) |
| 2005 | · Developed the laser-based Precision Spectroscopy | John Hall (US) Theodor W. Hänsch (Germany) |
| 2003 | · Developed the MRI (Magnetic Resonance Imaging) | Paul Lauterbur (US) Peter Mansfield (UK) |
| 2002 | · Analyzed the protein structure using the NMR at 600MHz solid state (Solid NMR) | Kurt Wüthrich (Switzerland) |
| | · Developed the electrospray and the MALDI-TOF to discover the protein molecular weight | John Fenn (US) Koichi Tanaka (Japan) |
| 1994 | · Neutron Spectroscopy and Neutron Diffraction Technique | Bertram Brockhouse (Canada) Clifford Shull (US) |
| 1991 | · Develop the Nuclear Magnetic Resonance Spectroscopy (NMR), required equipment to discover the molecular structure of the material | Richard Ernst (Switzerland) |
| 1989 | · Contributed to the rapid development in the atomic precision spectroscopy by inventing the separated vibration field and developed the Hydrogen Maser | Hans Dehmelt (Germany) Wolfgang Paul (Germany) Norman Ramsey (US) |
| 1986 | · Firstly developed the Electron Microscope and developed the STM from the concept of 'tunnel effect' in the quantum physics only found in elementary particles | Ernst Ruska (Germany) Gerd Binnig (Germany) Heinrich Rohrer (Switzerland) |
| 1979 | · Developed the Computer Assisted Tomography | Allan Cormack (US) Godfrey Hounsfield (US) |

● GRAST, Dreaming the future of Korea and heading toward the world-class status

| | | |
|------|--|--|
| 1964 | · Molecular structure crystal using the X-ray crystallography (X-ray diffraction equipment) | Dorothy Crowfoot Hodgkin (UK) |
| 1961 | · Discover the river distribution of nucleus from the study on the Compton Effect and the scintillation counter | Robert Hofstadter (US) |
| | · Discovered the Mossbauer Effect of generating the gamma ray (Research on the resonating absorption of the gamma ray) | Rudolf Mossbauer (Germany) |
| 1959 | · Invented the Polarography using the loaded mercury polar | Jaroslav Heyrovsky (Czech) |
| 1953 | · Developed the Phase Contrast Microscope | Frits Zernike (the Netherlands) |
| 1952 | · Invented the Partition Chromatography and the Partition Chromatography for the application of the separation and analysis of materials | Archer Martin (UK) Richard Synge (UK) |
| 1948 | · Developed the Tiselius Electro-Phoresis Apparatus and contributed to the studies on the serum protein | Arne Tiselius (Sweden) |
| 1937 | · Discovered the electron beam diffraction using the nickel crystal surface and proved the 'wave features of the electron' | Clinton Davisson (US) George Thomson (UK) |
| 1936 | · Studied and contributed to the Dipole Moment, X-ray and light scattering in the air | Petrus Debye (the Netherlands) |



Charles Kuen Kao (China)



Willard S. Boyle (Canada)



Gerd Binnig (Germany)



P. Lauterbur (United State)



Sir P. Mansfield (United State)



Developed the MRI (Nobel laureate in 2003)