



## UNIVERSITAS GADJAH MADA

Bulaksumur, Yogyakarta 55281, Telp. +62 274 588688, 562011, Fax. +62 274 565223

<http://ugm.ac.id>, E-mail: [setr@ugm.ac.id](mailto:setr@ugm.ac.id)

Nomor : 288/PV/Dir-KA/2021

15 Maret 2021

Lampiran : 1 berkas

Hal : **Undangan *Info Session Brain Korea 21 (BK 21) Four Jeonbuk National University (JBNU) Korea Selatan***

Yth.

1. Dekan Fakultas
  2. Dekan Sekolah Pascasarjana
- Universitas Gadjah Mada

Bersama ini kami sampaikan Edaran/Pengumuman Program Beasiswa *Brain Korea 21 (BK 21) Four* dari Jeonbuk National University (JBNU) Korea Selatan, terkait pembukaan pendaftaran program beasiswa bagi mahasiswa dan dosen Universitas Gadjah Mada untuk jenjang S2 dan S3 di berbagai bidang yang ditawarkan (informasi terlampir). Selain itu akan disampaikan pula potensi kerja sama penelitian yang dapat dilakukan dengan UGM.

Sehubungan dengan hal tersebut, pihak JBNU akan mengadakan pertemuan penyampaian informasi (*info session*) terkait program tersebut. Kami mohon kehadiran Bapak/Ibu atau perwakilan fakultas/departemen (bisa lebih dari satu) pada:

Hari/Tanggal : Kamis, 18 Maret 2021

Pukul : 14.00 - 15.00 WIB

Agenda : *Info Session Brain Korea 21 (BK 21) Scholarship Opportunities*

Platform Zoom Meeting dengan tautan:

<https://us02web.zoom.us/j/5762126872?pwd=Z0VqdVhoTFJEWjZkT2kwWjJ5eCtRdz09>

ID : 576 212 6872

Passcode : 518911

Kami mohon bantuan Bapak/Ibu untuk menginformasikan *info session* Program Beasiswa tersebut kepada mahasiswa dan dosen potensial yang akan melanjutkan studi S2 dan S3. Registrasi dapat dilakukan sebelum kegiatan pada link berikut: [ugm.id/VISJBNU](http://ugm.id/VISJBNU)

Atas perhatian dan bantuan Bapak/Ibu, kami ucapkan terima kasih.

Direktur Kemitraan, Alumni dan Urusan  
Internasional



**Dr. Danang Sri Hadmoko, M.Sc.**

**Agenda**  
**Virtual Info Session**  
**Admission Information for Graduate School, JBNU and Introduction to Brain Korea 21**  
**Four Project**  
*Thursday, 18 March 2021*

TIME	DURATION	AGENDA
13.55-14.00	5'	Entry of Participants
14.00-14.05	5'	Start of Info Session by MC
14.05-14.10	5'	<i>Opening Remarks</i> by both Universities 1. UGM: Director/Vice Director of Partnerships, Alumni and Global Initiatives 2. JBNU: Vice President for International Affairs
14.10-14.15	5'	<i>Short Introduction</i> of both Universities 1. UGM (Head, Office of International Affairs) 2. JBNU
14.15-14.25	10'	Introduction to Energy AI program by Dr. Yang
14.25-14.35	10'	Introduction to BK 21 by the vice dean of the graduate school (of JBNU)
14.35-14.55	20'	Q&A Session
14.55-15.00	5'	Photo Session & Closing by MC

# Brain Korea 21 Four

Dr. Bumseok Kim (BK)  
Vice President of Graduate School

*Jeonbuk National Universtiy*

---



# Table of Content

1. Introduction to BK 21 Project & BK 21 Four
2. BK 21 Four Participating Research Teams
3. BK 21 Project Selection Criteria & Benefits



# BK 21 Project

Project to both develop master's & doctorate-level human resources by supporting graduate students through scholarships, to help next generation graduate students to focus on their studies and research.

- 1st Project (1999~2005)
- 2nd Project (2006~2012)
- 3rd Project (2013.9~2020.8)
- **Project Four (Current, 2020.9~2027.8)**



# BK 21 Four

To foster creative, adventurous master's / doctorate-level human resources and world-class research-oriented Universities in response to social changes such as the 4th Industrial Revolution, and population decline.

## **BK 21 Four Main Focus**

- Train research personnel for national and social needs
- Create a stable academic and research-oriented environment for graduate schools
- Increase competitiveness by enhancing research quality
- Consolidate Graduate Education and Research

# BK 21 Four Vision & Goal

## VISION

**Cultivate World-class Research-oriented University**

## GOAL

- Enhance research capabilities in key academic fields and train next generations
- Reorganize the graduate school system and consolidate the graduate education

## Direction

### Enhance Research Competitiveness

- Expand the qualitative assessment of research results
- Support various fields related to research results such as economy, sociology, culture

### Train Master / Doctor -Level HR

- Expand the supporting size of masters, doctorate students
- Increase research scholarships to create research academic environments

### Consolidate Graduate Education and Research

- Consolidate curriculum and strengthen academic management
- Improve graduate school through new support fund

### Train National, Social Researchers

- Develop a new innovative human resources
- Concentrated training of research personnels in key industries of the country

# BK 21 Four

- Period : 2020. 9 ~ 2027. 8 ( 7 years )
- Cost : \$ 2.6 Billion
- Participant: Research Group (Team)
- Project in Detailed Categories



## 1) Cultivating Future Human Resource :

To enhance research capabilities in core academics (Science, Technology, Humanities) and to foster a new generation of scholars

## 2) Cultivating Innovative Human Resource :

To assist researchers with solving new industrial/social issues, and help them to lead innovations

### 8 Innovative Industries (`17.11)

Smart factory / farm / city, Fin Tech, New Energy, Bio-Health, Drone, Future Health Care

### 13 Innovative Engineering Sector (`17.12)

Big Data, Next-generation Communication, AI, Customized Healthcare, VR/AR, Intelligent Robot / Semiconductor, High-tech Materials, Innovative Medication, Renewable Energy, Smart City, Drone, Automated Driving

\*Accomplishment Examples



# 4th BK 21 Participating Research Group (Team)

No.	Research Group (Team)	Department	Supervisor	Sup's E-mail
1	Team for Intelligent Precision System (TIPS)	Department of Mechanical System Engineering	Kim Dae suk	dashi.kim@jbnu.ac.kr
2	Nano Convergence Institute for Innovative Energy Materials and Devices	Department of Nano Convergence Engineering	Hak-Yong Kim	nanooffice@jbnu.ac.kr
3	Educational Research Institute of Bionanotechnology and Bioconvergence Engineering	Department of Bionanotechnology and Bioconvergence Engineering	Dong Won Lee	dlee@jbnu.ac.kr
4	Education and Research Center for Semiconductor and Chemical Engineering	School of Semiconductor and Chemical Engineering	Yun Yeoung-Sang	ysyun@jbnu.ac.kr
5	Innovative Education Center for Hydrogen Energy Convergence Technology	Department of Energy Storage/Conversion Engineering	Dong Jin Yoo	djyoo@jbnu.ac.kr
6	Next Generation Flexible and Printable Electronics	Graduate School of Flexible&Printable Electronics	Kang Jae Wook	jwkang@jbnu.ac.kr
7	JIANT-IT Human Resource Development Center	Division of Electronics and Information Engineerin	Ji-Hoon Lee	jihoonlee@jbnu.ac.kr
8	Human resources fostering team for smart electronic information materials	Department of Electronic and Information Materials Engineering	Yeon-Tae Yu	yeontae@jbnu.ac.kr
9	Environmental Education and Research Center for Glocal Resources Circulation	Department of Environment and Energy	Kitae Baek	kbaek@jbnu.ac.kr
10	Green-bio human resource development for controlling hazards in plant & animal	Agricultural Convergence Technology	Kim Jae Su	jskim10@jbnu.ac.kr
11	21st Century Medical Science Creative Human Resource Development Center	Department of Medical Science	Jong Suk Kim	jsukim@jbnu.ac.kr
12	Innovative research and education center for integrated bioactive materials	Department of Bioactive Material Sciences	Yong Suk Jang	yongsuk@jbnu.ac.kr
13	Glocal Future Chemical Talent Education and Research Team	Department of chemistry	Jeung Gon Kim	jeunggonkim@jbnu.ac.kr

ENGINEERING, SCIENCE, MEDICINE

# 4th BK 21 Participating Research Group (Team)

No.	Research Group (Team)	Department	Supervisor	Sup's E-mail
1	Future Welfare Developing Human Resources for Community Innovation	Department of Socialwelfare	Yoon Myeong Sook	yoons64@jbnu.ac.kr
2	Social Solidarity and Integration in a Fragmented Society	Department of Sociology	Seol, Dong-Hoon	dhseol@jbnu.ac.kr
3	Group for Training Psychological Service Specialists Who are Required for Super-Aged Society	Department of Psychology	Lee Young Soon	leey@jbnu.ac.kr
4	Born to Glocal Frontier Leaders Program	Division of International Trade	Kim Min Ho	kimmh@jbnu.ac.kr
5	Expert-RACC (A Graduate Program for the Expert to Overcome Glocal Crisis through the Research and Application of Culture and Civilization)	Department of Cultural Anthropology and Archaeology	Yi, Jeong Duk	jdyi@jbnu.ac.kr
6	Program for Nurturing Leaders in Homo D-Biblos with the Aim to Practice Social Tolerance	Program for Nurturing Leaders in Homo D-Biblos with the Aim to Practice Social Tolerance	Kim Geon	godardkim@jbnu.ac.kr
7	English Studies of Diversity and Inclusion for Cultivating Next Generation Specialists of South and Southeast Asian Countries	English Language & Literature Department	Chin-wan, Chung	atchung@hanmail.net
8	Research platform for fostering future talents in the area of china-korea's correlated literature studies of "Jiyonghapil"(Unity of Knowledge & Use)	Department of Chinese Language & Literature	Choi Namgyu	namg@jbnu.ac.kr

## Application Requirement

### Affiliation

A student who belongs to the department or professors who are participating in the BK 21 project

### Applicable Term

- Within 2 years of the enrollment in a Master's program
- Within 4 years of the enrollment in a Doctor's program
- Within 6 years of the enrollment in a Integrated Master/Doctor's program

### Full-Time

A student who is able to dedicate 40 hrs per week for research/study activities in an affiliated research group(team), without any extra occupation

# Application Requirements & Project Benefits

## Benefits

- 1) Support a fellowship (Master: \$630 / Doctor: \$1200 / Certificate : \$900)
- 2) Support 50% of Tuition Fee
- 3) Other activities support : Research (Thesis Publication, Attending Conference, etc)

# Thank you !

[bskims@jbnu.ac.kr](mailto:bskims@jbnu.ac.kr)



# Introduction to the “**Graduate School of Integrated Energy(PV)-AI**” Supported from the Ministry of Trade, Industry and Energy & KETEP

---

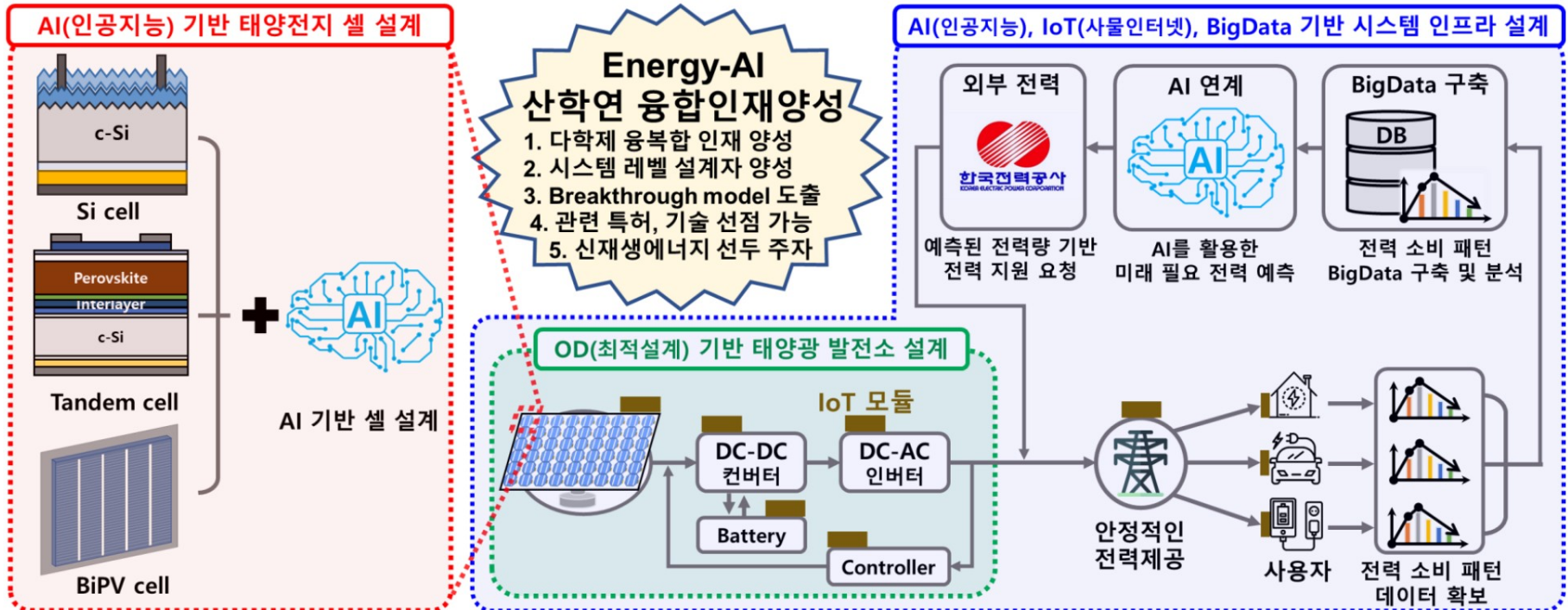
**O-Bong Yang**

Graduate School of Integrated Energy-AI &  
School of Chemical Engineering  
Jeonbuk National University, Korea

- Education of Master and PhD by Integrated PV(Photovoltaic)-AI(Artificial intelligence)
  - Project title: Energy-AI integrated Graduate School (Photovoltaic-AI Integrated Manpower Training Project)
  - Supervising agency: MOTIE/KETEP
  - Participating Institutions: Korea Univ. (Director Prof. Dong-hwan Kim), Hanwha Solutions Co, Shinsung ENG Co, LG Electronics TM Solutions Co, J Solution Co et al
  - Project period: 2020.6.1~2024.12.31 for 5years
  - Budget : 1B\$/year (5B\$/5years)
  - Objectives of PV-AI Projects
    - Education of PV-AI convergence manpower: 20/year of Master/PhD
    - Solar cell material and device innovation and smart grid optimization by PVAI
    - PVAI researcher will lead Korean PV industry and Korea N&RE Vision 3020 (20% N&RE by 2030)

## Project content: PV+AI+ $\alpha$ (IoT, big data) integrated Education and research

- Education and R&D for PV material/Device and smart grid based on AI
  - Adopting AI's Optimal Design Technique for high performance Si solar cell, Tandem cell, BIPV design/development
  - Smart grid design in Solar Power Plant by AI-based PV Technology and Big Data provided by IoT.



전북대, 고려대, 산업체

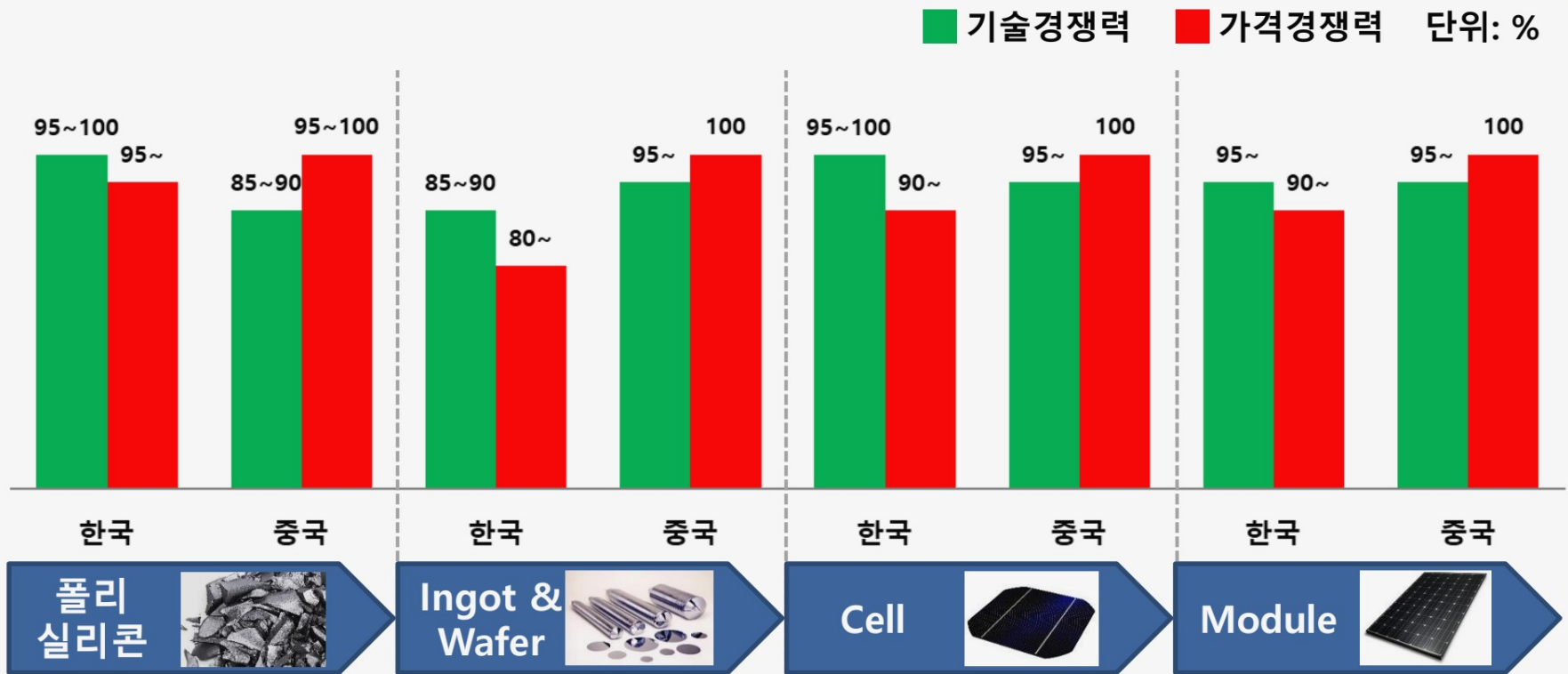
(한화솔루션, 신성E&G, 솔라시도코리아, SG에너지, 씨피에스, 제이솔루션, 중앙강재)

전북대, 산업체

(티엠솔루션스, 금강이엔지, 삼신기업)

- **Securing PV's Competitiveness vs China: PV-AI integration is key for Technology innovation**
  - China has excellent price competitiveness: Korea needs to compete with China by securing technological competitiveness
  - Korea's strategy to secure technological competitiveness: Technology innovation through the integration of AI and PV is key

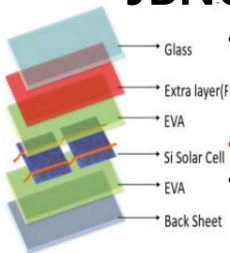
In 2018, Korea VS China PV Co Competitiveness, G: Tech, R: Price





## ■ PVAI Convergence Training Strategy:

### JBNU Research

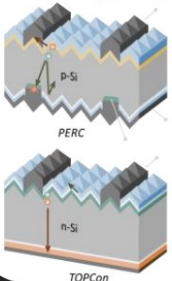


- Next Generation cell materials development by AI tech
- **BIPV** Solar cell design
- AI-based PV power plant design and smart grid

### Joint technology



### Korea University Research



- AI based PERC solar cell device design
- AI based Design of Tandem-type Solar Cells
- IoT Based Solar Cell Deterioration Study

### Curriculum

	1학기	2학기	3학기	4학기
AI 응용 교육 과정	반도체 이론	PV 이론	모듈 및 시스템	PV-AI 융합
현장실습 인턴십	AI 기초 및 응용		현장실습 (셀, 모듈 제작 및 발전소 견학)	인턴십 AI 산업응용 (태양광 업체)
학생참여 R&D 프로젝트	한화솔루션, 신성이엔지, 티엠솔루션스, 제이솔루션 애로기술 해소			
융합교육	전북대-고려대 AI 온라인강의 상호제공, 인력교류, 협동세미나, 협동연구			

- 인턴십 현장 실습 제공
- 기업체 전문가 PV 특강

### Industry

- Cooperative PVAI research and provide the internship
- Supply the big data for PVAI cooperation



### 융합인력양성

- AI 기반 최적화 모델 제공
- PV-AI 융합 인재 공급

## Jeonbuk National University

- BIPV with PVAI
- Perovskite and organic PV with AI tech
- Sola cell new materials based on AI
- Smart grid study with PVAI

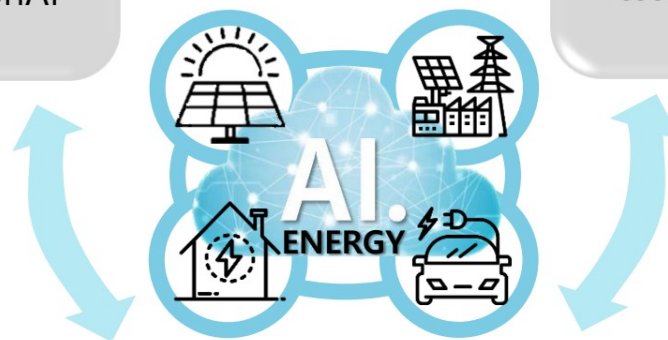


## Korea University

- Ultra High Efficiency Solar Cell technical research (target over 26.5%)
- IoT+AI solar cell Deterioration Research
- Tandem device by AI optimization design research (target over 28%)



### PV-AI Integrated Graduate School



### Industry-linked education

- PVAI customized R&D and training
- Special lectures by business experts on PV
- Provide big date for PVAI researches
- Internship



	1학기	2학기	3학기	4학기
Curriculum	<ul style="list-style-type: none"> <li>Organic and inorganic energy material</li> <li>Semiconductor device physics</li> <li>Special lecture on optoelectronic materials and devices</li> <li>Basic theory of semiconductor and solar cell</li> <li>Artificial intelligence theory</li> </ul>	<ul style="list-style-type: none"> <li>BIPV solar cell and module design</li> <li>Hybrid convergence device special lecture</li> <li>Special lecture on energy storage technology</li> <li>High efficiency and thin film solar cell technology (Si, CIGS, Perov, Tandem)</li> <li>Artificial intelligence application</li> </ul>	<ul style="list-style-type: none"> <li>Solar cell and module deterioration, analysis and simulation</li> <li>AI-based solar conversion technology and design</li> <li>Optimal Design (OD) Theory and Programming for Photovoltaic Power Plant Design</li> <li>Design Theory of IoT and AI-Based Solar Cells</li> </ul>	<ul style="list-style-type: none"> <li>Fuzzy-based economic and environmental analysis</li> <li>IoT-based solar cell practice</li> <li>Paper Experiment Presentation-PVAI</li> <li>Industry-academia collaboration project and thesis guidance</li> </ul>
Advanced Course	<ul style="list-style-type: none"> <li>Artificial Intelligence: Special Lecture on Big Data Processing Statistics</li> <li>Solar cell: solar device manufacturing and measurement practice</li> <li>PVAI Integrated Seminar</li> </ul>			
Industry Internship	<p><b>Field practice</b></p> <ul style="list-style-type: none"> <li>Solar Cells, Modules Design and Production Field Exercise</li> <li>Field Exercise in Design and Construction of Photovoltaic Power Plants</li> </ul>		<p><b>Internship</b></p> <ul style="list-style-type: none"> <li>Internship of Solar Cells and Modules Companies</li> <li>Internship of Solar Power Plant Design and Construction Company</li> </ul>	
R&D project	<p><b>Student-led Corporate Customized R&amp;D Project</b></p> <ul style="list-style-type: none"> <li>Hanwha Solution: AI-based charge-selective solar cell and module technology development</li> <li>LG electronics: AI-based double-sided light-receiving solar cell development</li> <li>Shinsong E&amp;G: AI-based TOPCON solar cell characteristics analysis and improvement technology</li> <li>TM solutions: OD(Otimal design) development for solar power plant</li> <li>Solar city Korea: Development of AI-based paste materials</li> <li>SG energy: AI-based BIPV development</li> <li>Geumgang Energy</li> <li>CPS</li> <li>J solutions</li> <li>Central Steel</li> </ul>			
Cooperative education	<p><b>Jeonbuk National University-Korea University Education exchange</b></p> <ul style="list-style-type: none"> <li>Supply mutual online lecture</li> <li>R&amp;D project of Jeonbuk National University-Korea University-industry-academia cooperation research progress</li> <li>Conducting Human Resources Exchange and organizing a cooperative seminar</li> </ul>			

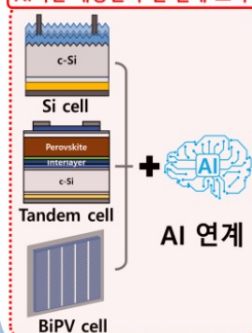
# PVAI Education Curriculum

curriculum		Subject	AI (Artificial Intelligence) based solar cell design	Solar power plant design based on OD (optimal design)	AI, IoT, BigData infrastructure design and system
<b>Solar energy (Total 21 subjects)</b>	Organic and inorganic energy material	O			
	Semiconductor device physics	O			
	Special lecture on optoelectronic materials and devices	O			
	Basic theory of semiconductor and solar cell	O			
	Special lecture on energy storage technology	O	O	O	
	BIPV solar cell and module design	O		O	
	Hybrid convergence device special lecture	O			
	Fundamental Theory of Semiconductor and Solar Cells	O		O	
	High efficiency solar cell technology	O			
	High efficiency and thin film solar cell technology (Si, CIGS, Perov, Tandem)	O			
	Solar cell and module deterioration, analysis and simulation	O	O	O	
<b>AIBO* (AI, IoT, Bigdata)</b>	Artificial intelligence theory	O	O	O	
	Artificial intelligence application	O	O	O	
	AI-based solar conversion technology and design		O	O	
	Optimal Design (OD) Theory and Programming for Photovoltaic Power Plant Design		O		
	Design Theory of IoT and AI-Based Solar Cells		O	O	
	Special lecture on Big Data Processing Statistics		O	O	
	Fuzzy-based economic and environmental analysis			O	
	Practice of IoT and AI-based solar cells			O	
Electronics Interpretation Software Class			O		
<b>Industry Subjects (5 Subject)</b>	Industry Cooperation Seminar	O			
	Industry Internship	O			

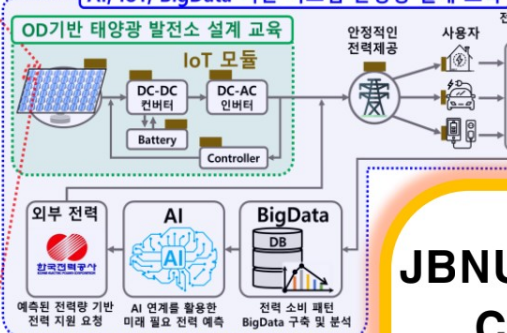
\*AIBO: AI, IoT(사물인터넷), BigData, Optimal Design(OD)

## AI, IoT, 빅데이터, 최적설계 기반 BIPV, Perovskite, 생산기술, 발전소 설계

### AI기반 태양전지 셀 설계 교육

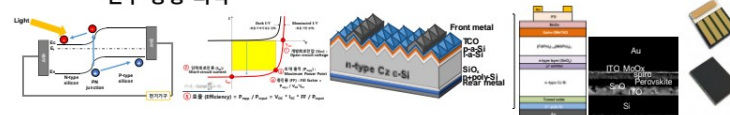


### AI, IoT, BigData 기반 시스템 안정성 설계 교육

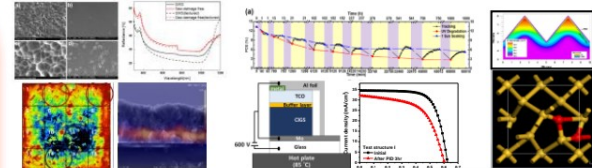


## 박막(CIGS)/고효율 실리콘 태양전지, 열화 및 안정성

- 태양광 기초 이론 교육
- 태양광 고효율화 기술 교육
- 신재생에너지 기초 이론 습득 및 연구 동향 파악
- 고효율 태양전지 설계
- 탠덤 태양전지



- 태양광 소자, 모듈의 분석 및 시뮬레이션 교육
- 태양광 분석 교육
- 열화 원인 분석
- 시뮬레이션



## JBNU-Korea Univ. Cooperative Education

### Industry-Academic Cooperation Seminar and tutorials

- Energy special seminar**
  - Energy sector policy, Market, Inviting domestic and foreign experts
- Energy start-up course**
  - start-ups in the energy sector, Technology transfer, Patent writing method, Specialist Invitation Seminar on Research Methodology, etc.
  - Introducing energy specialists for work/employment by explaining the current status of the industry
- Customized R&D projects and on-the-job training for companies**
  - Master/PhD Students participating in industrial interns for solving and improving the skills
  - Organizing a joint workshop based on industry-academia cooperative research
  - Participating Institutions-Participating Companies permission to utilize Research Facility Equipment and materials, manpower exchange, field training, and internship opportunities



(주)제이솔루션

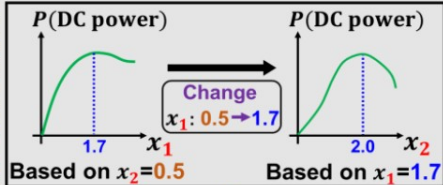


## Student-led R&D Project1

- Development of High efficiency silicon and tandem solar cells by AI based design methods
  - Development of Charging Selective Technology for High Efficiency Silicon Solar Cells and Modules(Hanwha Solutions)
  - Development of Tunnel Oxide-Based Solar Cell Technology(Shin seong energy)
  - Development of High-Efficiency bi-facial Solar Cells (LG electronics)

### Empirical design approaches

Design variables:  $(x_1, x_2)$   
Initial point:  $(x_1=0.5, x_2=0.5)$

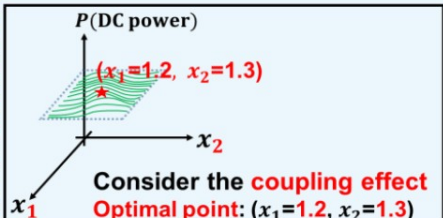


Better point:  $(x_1=1.7, x_2=2.0)$   
But, **not optimal point**

#### Limitation

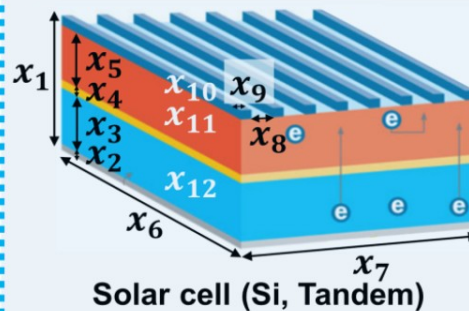
Can **not** consider the **coupling effect**  
(i.e. **coupling effect** between  $x_1$  and  $x_2$  in this example)

### AI-based design approaches



### AI-based design approach for the solar cells

Structural design variables:  $\{x_1, x_2, \dots, x_8, x_9\}$   
Material quantity design variables:  $\{x_{10}, x_{11}, x_{12}\}$

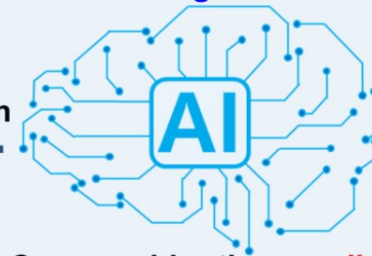


Experiment & Data Acquisition

Case	Design Variables						Performances		
	Structure (cm)			Material quantity (g)			Voltage (V)	Measured Current(A)	
	$x_1$	$x_2$	...	$x_9$	$x_{10}$	$x_{11}$	$x_{12}$		
1	2.0	0.2	...	0.1	20	180	200	-3.5057	1.364
2	2.5	0.1	...	0.1	15	170	150	-4.1291	1.760
3	3.8	0.3	...	0.2	18	230	180	-2.0588	0.760
⋮	⋮	⋮	...	⋮	⋮	⋮	⋮	⋮	⋮
n	1.5	0.1	...	0.1	22	250	220	-3.1291	1.259

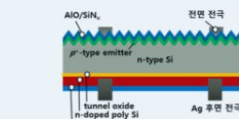
Build BigData

AI Algorithm



Data Learning

Optimization



한화솔루션: 전하선택형 PV



신성이엔지: TOPCon PV    고려대학교: Tandem PV

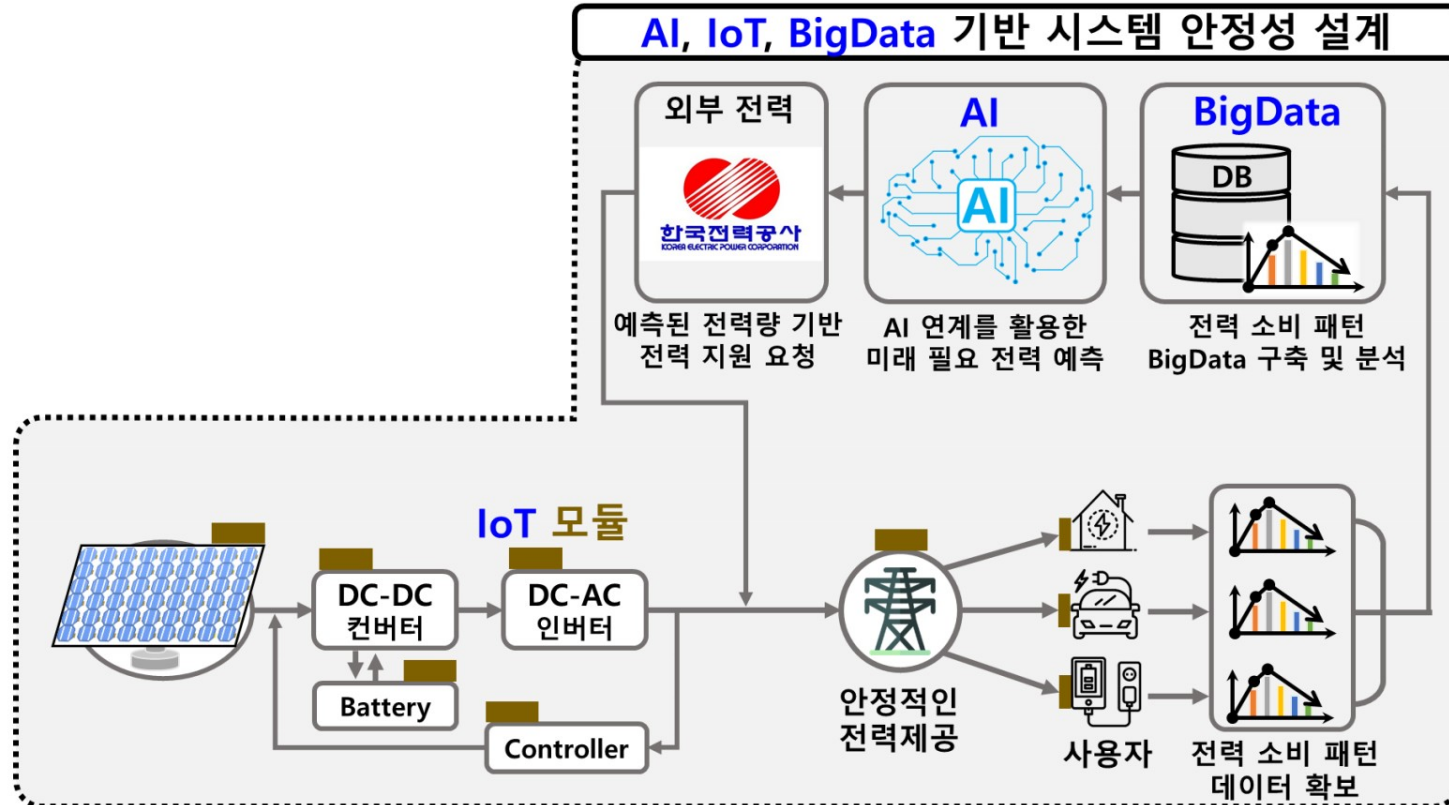
**Breakthrough (optimal) solar cell**

Can consider the **coupling effect** among all the design variables  $(x_1, \dots, x_n)$

## Student-led R&D project 2

### ○ AI, IoT(사물인터넷), BigData based smart grid design

- To ensure the stability of solar power plant systems by IoT-based big data for smart grid design and O&M
- Development of Power Demand and Supply Prediction by AI Program Based on BigData with IoT



## Director capability(Prof. O-Bong Yang)



양오봉  
교수

### AI 분야 전문가



정길도  
교수



이말례  
교수



이승범  
교수



한지훈  
교수

### IoT 분야 전문가



조성익  
교수



이종열  
교수

### PV 분야 전문가



이수형  
교수



김민  
교수



노원엽  
교수



M. Shaheer  
Akhtar 교수

Field of expertise: organic and inorganic material solar cells, next-generation solar cells, artificial intelligence, IoT

### 총괄 책임자 경력

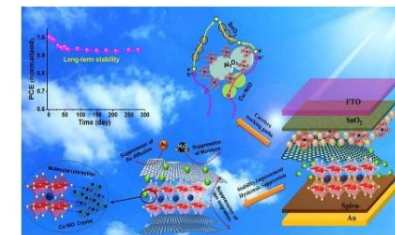
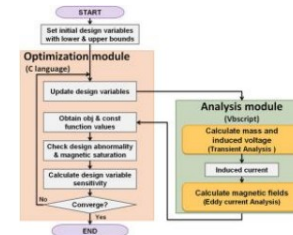
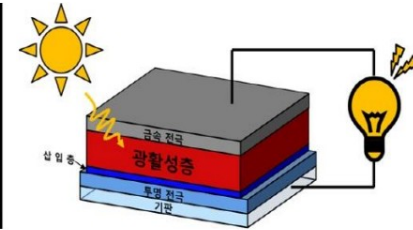
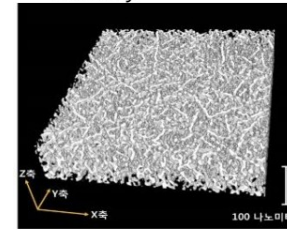
- 1) Member of the Saemangeum Committee (Chairperson)
- 2) Korea Photovoltaic Society, Chair
- 3) US National research energy laboratory(NREL) Visiting researcher
- 4) Saemangeum renewable energy projects, Members of the public council
- 5) A member of the Planning and Evaluation Committee of the Economic and Humanitarian Society Research Council
- 6) Nonghyup Economic Group, Solar Energy Advisor
- 7) Presidential Committee for Balanced National Development, Special Committee for Innovation City, Member
- 8) 1st Jeollabuk-do Regional Innovation Council, member
- 9) Global Photovoltaic Conference (GPVC) 2019, 2017 Chairman
- 10) Presidential Commission on Employment, Advisory Committee
- 11) Democratic Peace and Unification Advisory Council, Advisor

참여 교수들 최근 주요 연구 업적 : 600  
편 이상

- 1) SCIENCE
- 2) NATURE PHOTONICS
- 3) ADVANCED FUNCTIONAL MATERIALS
- 4) ADVANCED ENERGY MATERIALS
- 5) IEEE JOURNAL OF EMERGING AND SELECTED TOPICS IN POWER ELECTRONICS
- 6) IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY
- 7) ENERGY ENVIRONMENTAL SCIENCE
- 8) JOURNAL OF MATERIALS CHEMISTRY A
- 9) APPLIED SURFACE SCIENCE
- 10) NANO ENERGY
- 11) SOLAR ENERGY MATERIALS AND SOLAR CELLS  
etc.

### Representative research performance

- 1) Development of a foldable solar cell like paper
- 2) Development of high-efficiency organic solar cell using printing technology
- 3) Development of perovskite solar cell with improved stability





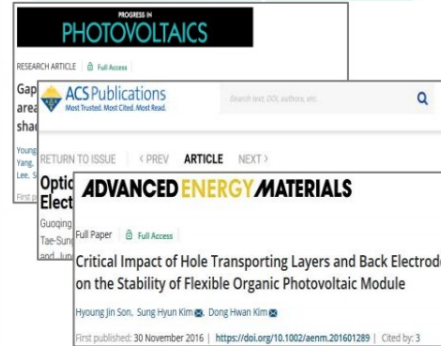
## Competency of the research director of the participating institution (Korea University)



김동환 교수    이해석 교수    전용석 교수    강윤묵 교수    박현정 박사

- Specialty: Silicon solar cell / module / tandem solar cell
- Technology transfer:
  - Technology transfer of new concept solar cell silicon wafer manufacturing technology”
  - (2009.12, fixed technology fee 200 million won + additional current technology fee)
  - Technology transfer of “coaxial solar cell technology”
  - (2010.01, flat-rate technology fee 280 million won + additional current technology fee)
- Major research achievements in the last 3 years: Adv. Energy Mater, Adv. Funct. Mater, ACS Appl Mater Interfaces, Prog. Photovoltaics, etc. (Recent 46 papers, IF sum> 150.0)
- Representative Research Achievements: Development of next-generation high-efficiency silicon solar cell technology, high-efficiency PERC solar cell and module mass production technology, and perovskite high-efficiency and stability technology development
- Tasks: 1. (Industry-Academic Cooperation) Research on lead-free paste for front and rear electrodes for simultaneous firing of crystalline silicon solar cells, 2. (national project) Development of ultra-high efficiency crystalline silicon solar cell and module mass production technology
- Awards:
  - 1.2019 Science and Technology Medal of Innovation (Ministry of Education, Science and Technology)
  2. 2018 International Conference PVSEC AWARD (Top Prize in Solar Power Field)
  3. 2013 Nanotechnology Award, Minister Award (Ministry of Science, ICT and Future Planning)
  - 4.2010 New Renewable Energy Grand Prize, Minister's Award (Ministry of Knowledge Economy)

### Representative thesis of Korea University

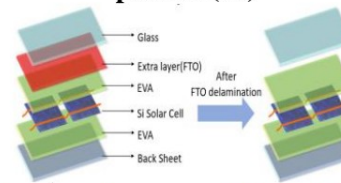


Published excellent papers in the field of silicon and tandem solar cells (more than 46 papers in the last 3 years)

*Advanced Energy Materials, Advanced Functional Materials, Progress In Photovoltaics* 등

### Korea University patent

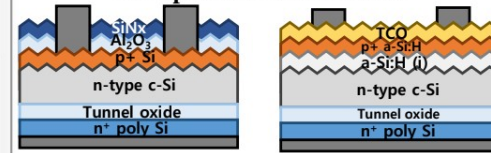
Silicon solar cell, module and perovskite solar cell field  
Material-device-process related patents (89)



Representative patent: Silicon solar cell module recycling technology

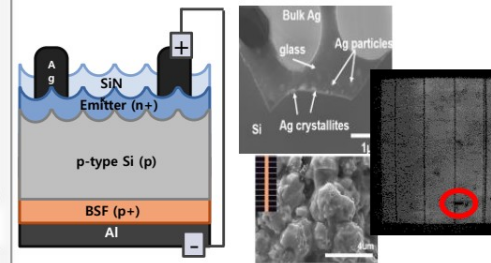
### High efficiency of silicon solar cell and development of tandem solar cell technology

<Development of next-generation high-efficiency solar cell technology and new concept solar cell structure>

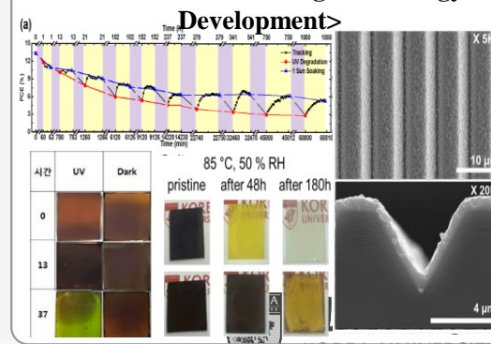


TOPCon 22.0% ASETOB 23.7%

<Silicon solar cell electrode formation mechanism analysis>



<Perovskite Solar Cell Safety Analysis and Conformal Coating Technology Development>



## Leading and Supporting the Korean PV Industry and Vision 3020

- ❑ 4GW renewable energy power plant in Saemangeum, Jeollabuk-do (Declaration of renewable energy vision)
- ❑ 3GW solar power plant, 1GW offshore wind farm, 0.1GW hydrogen fuel cell power plant, bio production facility
- ❑ Establishment of national renewable energy demonstration research complex (Saemangeum, Jeonbuk)
- ❑ Renewable energy demonstration and smart grid test bed
- ❑ Saemangeum renewable energy cluster, supply of high-quality human resources for the design and operation of the national empirical research complex

Saemangeum renewable energy vision declaration ceremony (2018.10.30.)

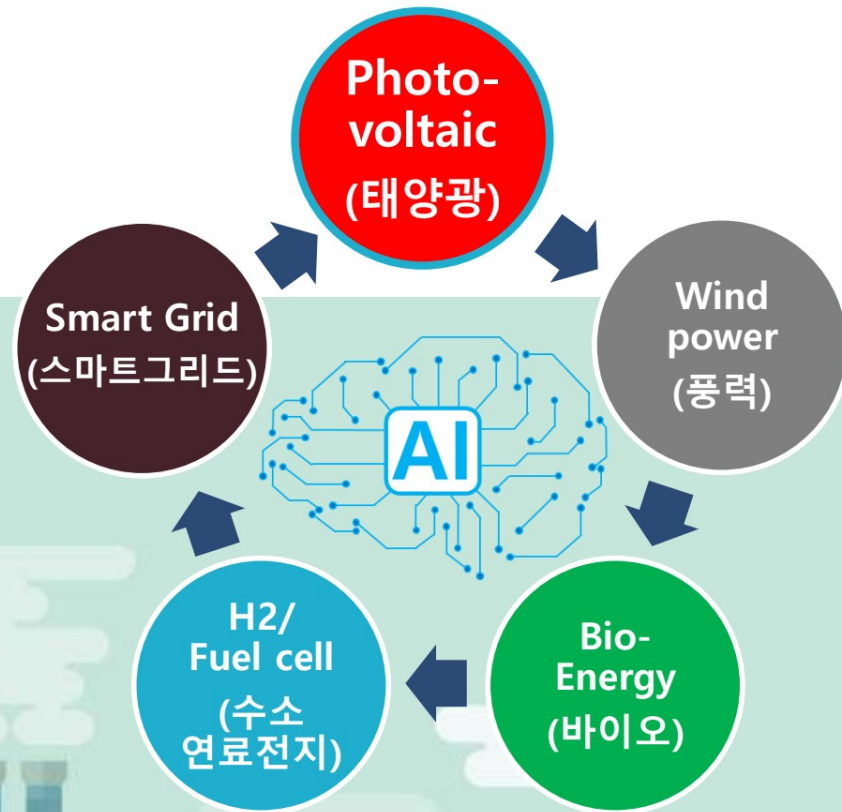


Saemangeum National Renewable Energy Demonstration Research Complex (draft), KETEP



# Our vision !

**Our PV-AI Integrated Graduate School will be the platform of convergence of AI and PV, Wind energy, bio-energy, hydrogen-fuel cell for the sustainable world.**



## 전북대 공대와 Universitas Gadjah Mada 화상회의

전북대와 BK21 사업단에서 학업과 연구를 보조할 수 있는 우수한 유학생 유치를 위해, 전북대 교수님들과 Universitas Gadjah Mada 교수님들간의 Zoom 화상회의를 개최하고 저 합니다. Energy AI 석박사 프로그램 소개와 BK 21 사업단 소개가 있을 예정이며, 우수 학생 유치를 희망하시는 교수님은 누구나 발표 또는 발언의 기회를 드리겠습니다. 즉석 발표를 원하시는 경우, 미리 1장 정도의 ppt 자료를 준비해 주시기 바랍니다.

목적: 공대 대학원을 위한 우수 유학생 모집

참여대상: 전북대/UGM 교수, 연구원 및 직원

상대대학: 인도네시아의 Universitas Gadjah Mada

시간: 3월 18일 오후 4:00-5:00

Zoom 회의 참가 주소(추후 변경될 수 있음):

<https://us02web.zoom.us/j/5762126872?pwd=Z0VqdVhoTFJEWjZkT2kwWjJ5eCtRdz09>

회의 ID: 576 212 6872

암호: 518911

UGM 소개:

1949년에 설립된 Gadjah Mada University는 인도네시아에서 가장 오래된 역사를 가지고 있으며, 규모가 가장 큰 연구중심의 종합대학입니다. Sleman, Special Region of Yogyakarta에 위치하고 있습니다. 인도네시아 대학, 반둥공과대학과 함께, 인도네시아의 최고수준의 대학이며, 2021년 세계 QS 순위는 254위이며, 인도네시아 국가내에서는 1위를 기록하였습니다.