

# ANNUAL REPORT

# 2021

**Ege University  
Solar Energy Institute**

119/1 St., #2  
Bornova, Izmir TR

[www.eusolar.ege.edu.tr](http://www.eusolar.ege.edu.tr)





**EGE UNIVERSITY**  
**SOLAR ENERGY INSTITUTE**

# **ANNUAL REPORT**

## **2021**

**Prepared By:**

**Fırat Salmanođlu**  
**Alper Ekici**  
**Özkan Nuhođlu**  
**Harun Gümüş**



# CHAIR'S MESSAGE

Welcome to the Solar Energy Institute's (EGE-SOLAR) annual assessment.

It underscores how our mission since our earliest days to improve lives through practical education and research is alive and flourishing.

The theme of this year's EGE-SOLAR's Showcase is 'Forward thinking and doing'.

We have almost passed difficult times for many of us, as we adapt to the changes that Covid-19 brings. But there are better times ahead, new opportunities and exciting possibilities await us.

At the end of a year like no other, we have come together with some of our leading academics to look beyond these turbulent times to outline a vision for a more optimistic and exciting future. How do we build that future in times of rapid change, encompassing geopolitical upheaval, economic uncertainty, climate crisis and global pandemic? How do we continue to make a difference to shaping society and changing lives and our world for the better?

Since our establishment, the Solar Energy Institute has been a trailblazer in higher education and research in the area of renewable technologies. We have been a valued partner for institutions and businesses across the globe. Our legacy in practice centred education and cutting-edge innovation has made and continues to make a positive impact on society. At EGE-SOLAR, you'll find a vibrant and productive environment for research and teaching across the disciplines, bringing together expertise to create new ideas and solutions to the challenges we face.

On these pages, our academics share how their research and innovation is creating transformative benefits for improving our nature, environment, and human condition, and we report highlights of our most recent discoveries and insights.



PROF. DR. CEYLAN ZAFER



## Ege University Solar Energy Institute



## ABOUT US:

Ege University Solar Energy Institute serving as a research and education centre for renewable energy resources such as solar power, biomass, wind and geothermal is established in 1978. It is the first and only institute leading these fields in Turkey. In accordance with the order from Council of Higher Education that taken into account on 23 December 1982, two departments have structured; namely Energy and Energy Technology. As of 2021, 27 academic, 7 administrative personnel, and 13 staff serve in our institute. Currently, there are 111 masters and 77 doctorate researchers are proceeding with their studies.

## OUR MISSION & VISION

We are aspiring to be an international institute holding up to universal standards in terms of generating information and technological development regarding energy resources and their utilization, with the objective of having a say in national energy policies by setting an example in our field through constant improvement.

Our mission is to produce information regarding renewable and clean energy resources, developing technologies, apply and extend the scope of these technologies by providing education, research and consultancy services to universities, research centers, industrial establishments and the society in general in order to achieve a sustainable environment.

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In Memory Of...





# OUR TEAM

## ENERGY TECHNOLOGY DEPARTMENT



*Chair*

**Prof. Dr.**

Ceylan ZAFER



**Prof. Dr.**

Günnur KOÇAR



**Prof. Dr.**

Hayati OLGUN



**Prof. Dr.**

Önder ÖZGENER



**Prof. Dr.**

Engin KARATEPE



**Assoc. Prof. Dr.**

Numan Sabit ÇETİN



*Vice Chair*

**Assoc. Prof. Dr.**

Melih Soner ÇELİKTAŞ



**Assoc. Prof. Dr.**

Koray ÜLGEN



**Asist. Prof. Dr.**

Ahmet ERYAŞAR



**Asist. Prof. Dr.**

Mete ÇUBUKÇU



**Asist. Prof. Dr.**

Hasan SARPTAŞ



**Asist. Prof. Dr.**

Halide DİKER



**Res. Asst. Dr.**

Ayşe İsmet ÇALIŞ



**Res. Asst. Dr.**

Özben KUTLU



**Res. Asst.**

Fırat SALMANOĞLU



**Res. Asst.**

Özkan NUHOĞLU



**Res. Asst.**

Şefik ARICI



**Lect.**

ASIYE GÜL BAYRAKCI ÖZDİNGİŞ



# OUR TEAM

## ENERGY DEPARTMENT



**Prof. Dr.**  
Mustafa GÜNEŞ



**Prof. Dr.**  
Şule ERTAN ELA



**Prof. Dr.**  
Orhan EKREN



**Assoc. Prof. Dr.**  
Ahmet YILANCI



**Asist. Prof. Dr.**  
Bircan DİNDAR



**Asist. Prof. Dr.**  
Neslihan ÇOLAK GÜNEŞ



*Vice Chair*

**Asist. Prof. Dr.**  
Burak GÜLTEKİN



**Res. Asst.**  
Alper EKİCİ



**Res. Asst.**  
Harun GÜMÜŞ

# OUR TEAM

## ADMINISTRATIVE AND SUPPORT STAFF

**Gültekin Özgür**

Institute Secretary

**Hülya Bardakçı**

Chair Assistant

**Melek Ersoy**

Student Affairs

**Nurcan Arvalı**

Student Affairs

**Dilek Topaloğlu**

Personnel

**Sibel Günal**

Personnel Affairs

**Gülbahar Yılmaz**

Circulating Capital

**Erol Suna**

Accounting

**Ali Adil Arvalı**

Electrician

**Galip Turan**

Electronics Technician

**Hüseyin Aykurt**

Staff

**Serkan Tekin**

Staff

**Hakan Çetin**

Staff

# FELLOWS, GRANTS, HONORS

Name	Programme
Dr. Duygu AKIN KARA	TÜBİTAK BİDEB-2218- National Postdoctoral Research Fellowship Program
Fikret Müge ALPTEKİN	YÖK 100/2000, TÜBİTAK-2211-C, TÜBİTAK-2214a
Onur BİLGİLİOĞLU	TÜBİTAK 1001 - The Scientific and Technological Research Projects Funding Program
Dilvin ÇEBİ	TÜBİTAK - 2211-C National PhD Scholarship Program in the Priority Fields in Science and Technology YÖK 100/2000
Gökhan DEVEKİRAN	BAP-ÖNAP
Elif GÖDEKMERDAN	YÖK 100/2000
Dr. Shirin GÜLTEKİN	Ministry of Development
Beril GÜNDOĞAN	YÖK 100/2000
Gülay Zeynep GÜNEL	TÜBİTAK - 2211-C National PhD Scholarship Program in the Priority Fields in Science and Technology Ministry of Development
Alim GÜRGEN	YÖK 100/2000
Burak KAHRAMAN	Ministry of Development
Dr. Adem MUTLU	TÜBİTAK - 2211-C National PhD Scholarship Program in the Priority Fields in Science and Technology YÖK 100/2000
Sevim ÖZGÜL	YÖK 100/2000
Müge ÖZTÜRK	TÜBİTAK - 2210-C National - MSc/MA Scholarship Program in the Priority Fields in Science and Technology
Arsen SUCU	YÖK 100/2000
Pınar BÜYÜK TABAN	YÖK 100/2000
Sevdiye Başak TURGUT	ARDEB-1003 TÜBİTAK - 2210-C National - MSc/MA Scholarship Program in the Priority Fields in Science and Technology
Merve UYAN	TÜBİTAK - 2214-A International Research Fellowship Programme for PhD Students TÜBİTAK - 2211-C National PhD Scholarship Program in the Priority Fields in Science and Technology
Çağdaş YAVUZ	YÖK 100/2000
Tamer Yeşil	TÜBİTAK - 2211-C National PhD Scholarship Program in the Priority Fields in Science and Technology
Mert YEŞİLDAL	TÜBİTAK 1001 - The Scientific and Technological Research Projects Funding Program

# COMMISSIONS

## ORGANIZATIONAL BODIES

### ADMINISTRATIVE BOARD

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PROF. DR. HAYATİ OLGUN  
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ASSOC. PROF. DR. KORAY ÜLGEN  
ASİST. PROF. DR. BURAK GÜLTEKİN  
REPORTER: GÜLTEKİN ÖZGÜR

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ASSOC. PROF. DR. M. SONER ÇELİKTAŞ  
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REPORTER: GÜLTEKİN ÖZGÜR

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PROF. DR. ŞULE ERTEN ELA  
ASSOC. PROF. DR. M. SONER ÇELİKTAŞ  
ASST. PROF. DR. NESLİHAN ÇOLAK GÜNEŞ  
ASST. PROF. DR. HASAN SARPTAŞ

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PROF. DR. MUSTAFA GÜNEŞ  
ASSOC. PROF. DR. M. SONER ÇELİKTAŞ  
ASSC. PROF. DR. KORAY ÜLGEN  
ASST. PROF. DR. BİRCAN DINDAR

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ASSOC. PROF. DR. M. SONER ÇELİKTAŞ  
ASST. PROF. DR. BURAK GÜLTEKİN  
RES. ASST. ALPER EKİCİ

### SYLLABUS CHECK TEAM

PROF. DR. CEYLAN ZAFER  
PROF. DR. MUSTAFA GÜNEŞ  
PROF. DR. ENGİN KARATEPE  
ASSOC. PROF. DR. M. SONER ÇELİKTAŞ  
ASSOC. PROF. DR. KORAY ÜLGEN

### QUALITY ENVOYS

RES. ASST. ALPER EKİCİ (PH.D CAND)  
RES. ASST. ÖZKAN NUHOĞLU (MASTERS)

### STUDENT REPRESENTATIVE

RES. ASST. ALPER EKİCİ (PH.D CAND)  
SEVDİYE BAŞAK TURGUT (MASTERS)

In 2021;

The Administrative Board convened 31 times and made 57 decisions

The Institutional Board convened 26 times and made 58 decisions

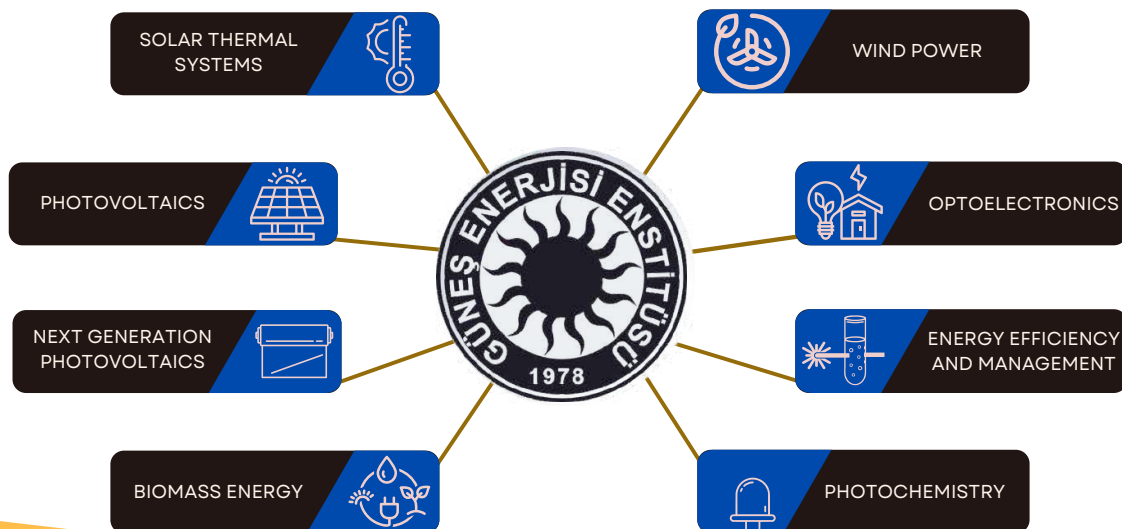
The Academic Board convened 2 times and made 6 decisions

## PUBLICATIONS

Upon almost 44 years of development in renewable energy platforms and infrastructure, the Solar Energy Institute is currently the most productive institution in Ege University. Over the 2021 calendar year, we come along with 29 SCI articles that researched by our precious professors, students and guest researchers. Besides, most of these articles have covered modern power generation and smart usage technologies that directly connected to UNDP Sustainable Development Goals. In line with the purpose of producing renewable and sustainable energy technologies, the Solar Energy Institute is excitedly working on further developments while the planet earth is desperately needing them.



Solar Energy Institute has rewarded by the Presidency of Ege University as the BEST RESEARCH INSTITUTE OF THE YEAR 2020, according to results of EGEVIDO performance criterias



# LIST OF PUBLICATIONS

2021 Publications

## ENERGY TECHNOLOGY DEPARTMENT

**Experimental investigation on performance parameters affecting the efficiency of water type PV/Thermal collectors with modified absorber configurations** Dag, Halil Ibrahim; Kocar, Gunnur

**Optimization of process parameters in oxygen enriched combustion of biocoal and soma lignite blends by response surface methodology** Keivani, Babak; Olgun, Hayati; Atimtay, Aysel T.

**Exergy analyses of a tunnel furnace and a tunnel dryer** Tahtali, Gurhan; Olgun, Hayati; Gunes, Mustafa; Hepbasli, Arif

**Thermodynamics analysis of biomass fired brick drying process** Dogru, Aziz Kagan; Camcioglu, Emre; Ozgener, Onder; Ozgener, Leyla

**Evaluation of the efficiency of the dryers in thermoplastic vulcanisate extrusion production lines with the energy and exergy analysis method** Dogru, Aziz Kagan; Ozgener, Onder; Ozgener, Leyla

**Performance improvement of P3HT nanowire-based organic solar cells by interfacial morphology engineering** Kiymaz, Deniz; Kiymaz, Aykut; Zafer, Ceylan

**Investigation of graphene-based Schottky junction solar cell with heavy-doped silicon** Jehad, Ala K.; Yurddaskal, Metin; Gunes, Fethullah; Zafer, Ceylan; Kocabas, Kemal

**Enhanced performance of ultra-thin polyaniline supercapacitor via aniline blue-WS SAMs with rich nucleation site** Kiymaz, Deniz; Kiymaz, Aykut; Dincalp, Haluk; Zafer, Ceylan

**Utilization of coordinating green solvents for high quality methylammonium bismuth iodide thin films for photovoltaic applications** Mutlu, Adem; Yesil, Tamer; Zafer, Ceylan

## ENERGY TECHNOLOGY DEPARTMENT

**Approach To Enhance the Stability and Efficiency of Triple-Cation Perovskite Solar Cells by Reactive Antisolvents** Mutlu, Adem; Yesil, Tamer; Kiyamaz, Deniz; Zafer, Ceylan

**Anticancer activities of bioactive peptides derived from rice husk both in free and encapsulated form in chitosan** Ilhan-Ayisigi, Esra; Budak, Gozde; Celiktas, Melih Soner; Sevimli-Gur, Canan; Yesil-Celiktas, Ozlem

**Stochastic optimization energy and reserve scheduling model application for Alaçati**, Turkey Özay, Can, Çeliktaş, Melih Soner

**A supervised ensemble learning method for fault diagnosis in photovoltaic strings** Kapucu, Ceyhun; Cubukcu, Mete

**Investigating the impact of weather parameters selection on the prediction of solar radiation under different genera of cloud cover: A case-study in a subtropical location** Chakchak, Jamel; Cetin, Numan Sabit

**Assessment of Electricity Industries in SADC Region Energy Diversification and Sustainability** Bowa, K. C.; Mwanza, M.; Sumbwanyambe, M.; Ulgen, K.; Pretorius, J. H.

**Observed changes and trends in heatwave characteristics in Turkey since 1950** Erlat, Ecmel; Turkes, Murat; Aydin-Kandemir, Fulya

**Assessing primary areas for a sustainable biochar application in soil by using GIS-based multi-criteria evaluation** Kutlu, Ozben; Aydin-Kandemir, Fulya; Sarptas, Hasan

**Photocatalytic activity of dye-sensitized and non-sensitized GO-TiO<sub>2</sub> nanocomposites under simulated and direct sunlight** Ilhan, Hatice; Cayci, Gamze Belkis Durmaz; Aksoy, Erkan; Diker, Halide; Varlikli, Canan

# 2021 Publications

# LIST OF PUBLICATIONS



### ENERGY DEPARTMENT

**Sizing of a solar-wind hybrid electric vehicle charging station by using HOMER software** Ekren, Orhan; Canbaz, Celal Hakan; Guvel, Cetin Berk

**Review of wellbore flow modelling in CO<sub>2</sub>-bearing geothermal reservoirs** Canbaz, Celal Hakan; Ekren, Orhan; Aksoy, Niyazi

**Device Performance of Emerging Photovoltaic Materials (Version 2)** Almora, Osbel; Baran, Derya; Bazan, Guillermo C.; Berger, Christian; Cabrera, Carlos, I; Catchpole, Kylie R.; Erten-Ela, Sule; Guo, Fei; Hauch, Jens; Ho-Baillie, Anita W. Y.; Jacobsson, T. Jesper; Janssen, Rene A. J.; Kirchartz, Thomas; Kopidakis, Nikos; Li, Yongfang; Loi, Maria A.; Lunt, Richard R.; Mathew, Xavier; McGehee, Michael D.; Min, Jie; Mitzi, David B.; Nazeeruddin, Mohammad K.; Nelson, Jenny; Nogueira, Ana F.; Paetzold, Ulrich W.; Park, Nam-Gyu; Rand, Barry P.; Rau, Uwe; Snaith, Henry J.; Unger, Eva; Vaillant-Roca, Lidice; Yip, Hin-Lap; Brabec, Christoph J.

**Pyrocatechol violet sensitized cadmium and barium doped TiO<sub>2</sub>/ZnO nanostructures: As photoanode in DSSC** Ullah, Naimat; Shah, Syed Mujtaba; Ansir, Rotaba; Erten-Ela, Sule; Mushtaq, Syed; Zafar, Saima

**Preparation of blue luminescence gold quantum dots using laser ablation in aromatic solvents** Ali, Abdulrahman K.; Erten-Ela, Sule; Ismail, Raid A.; Yavuz, Cagdas

**4,4-Nitrophenoxyaniline derived Azo ester: Structural elucidation, DFT simulation, and DNA interactional studies via wet and in silico methods** Qamar, Samina; Perveen, Fouzia; Akhter, Zareen; Yousuf, Sammer; Sultan, Muhammd; Ela, Sule Erten; Ullah, Naimat; Fatima, Kalsoom; Kanwal, Sehrish

**An electron rich indaceno [2,1-b:6,5-b'] dithiophene derivative as a high intramolecular charge transfer material in dye sensitized solar cells** Barlog, Maciej; Yavuz, Cagdas; Ali, Abdulrahman K.; Kandemir, Zafer; Comi, Marc; Bazzi, Hassan S.; Al-Hashimi, Mohammed; Erten-Ela, Sule

## ENERGY DEPARTMENT

**Pulsed Laser Ablation of Tin Oxide Nanoparticles in Liquid for Optoelectronic Devices** Ismail, Raid A.; Erten-Ela, Sule; Ali, Abdulrahman K.; Yavuz, Cagdas; Hassoon, Khaleel I.

**Solar process heat for sustainable production of concentrated peach puree** Colak Gunes, Neslihan; Gungor, Emrah; Gunes, Mustafa

**A comprehensive review of solar photovoltaic hybrid food drying systems** Barisik Marasli, Damla; Colak Gunes, Neslihan; Tavman, Sebnem

**Structure-Property Relationship in Amber Color Light-Emitting Electrochemical Cell with TFSI Counteranion: Enhancing Device Performance by Different Substituents on N boolean AND N Ligand** Demir, Nuriye; Karaman, Merve; Yakali, Gul; Tugsuz, Tugba; Denizalti, Serpil; Demic, Serafettin; Dindar, Bircan; Can, Mustafa

**Silylethynyl Substitution for Preventing Aggregate Formation in Perylene Diimides** Aksoy, Erkan; Danos, Andrew; Li, Chunyong; Monkman, Andrew P.; Varlikli, Canan

**Carbon nanotube supported thiospinel quantum dots as counter electrodes for dye sensitized solar cells** Sarilmaz, Adem; Ozen, Abdurrahman; Akyildiz, Hasan; Gultekin, Sirin Siyahjani; Kus, Mahmut; Ozel, Faruk

**Thermodynamic and Economic Assessment of Solar Thermal Power Plants for Cameroon** Biboum, Alain C.; Yilanci, Ahmet

**Enhanced thermodynamic and economic investigation of using heat recovery steam generators for solar thermal power plants** Biboum, Alain Christian; Yilanci, Ahmet

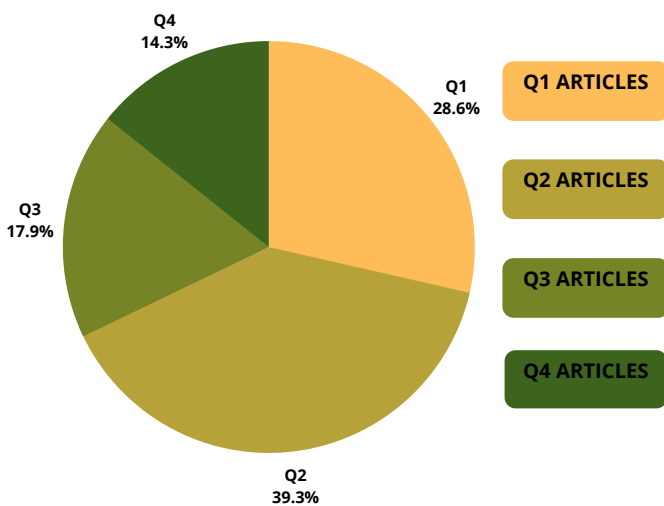
# 2021 Publications

# LIST OF PUBLICATIONS

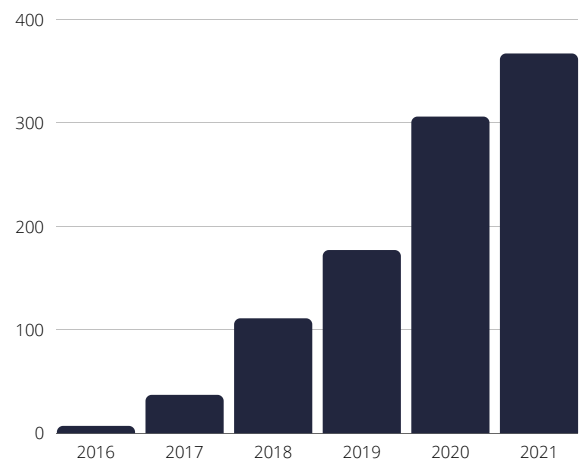
# MILESTONES

## PUBLICATIONS & CITATIONS

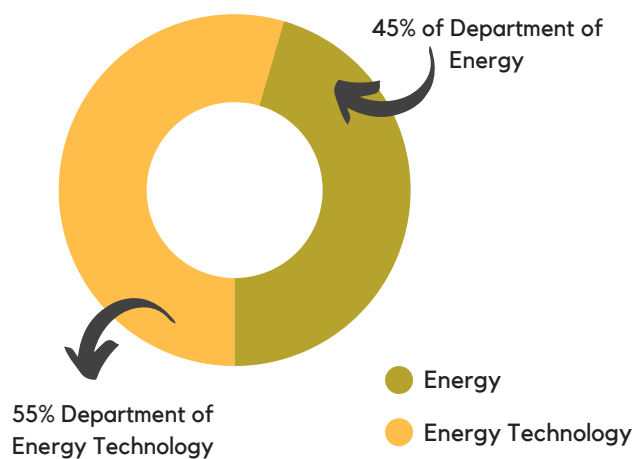
More than the quantity in numbers, quality parameters of research articles are also valuable for us. Our development vision encourages researchers to be involved in high impact factor journals. In the year 2021, 19 of the total 29 articles (over %65) were published in Q1 and Q2 Science Citation Index journals.



**2021 articles by Q category**



**The distribution of the citations from publications that made by our institute in last 6 years**

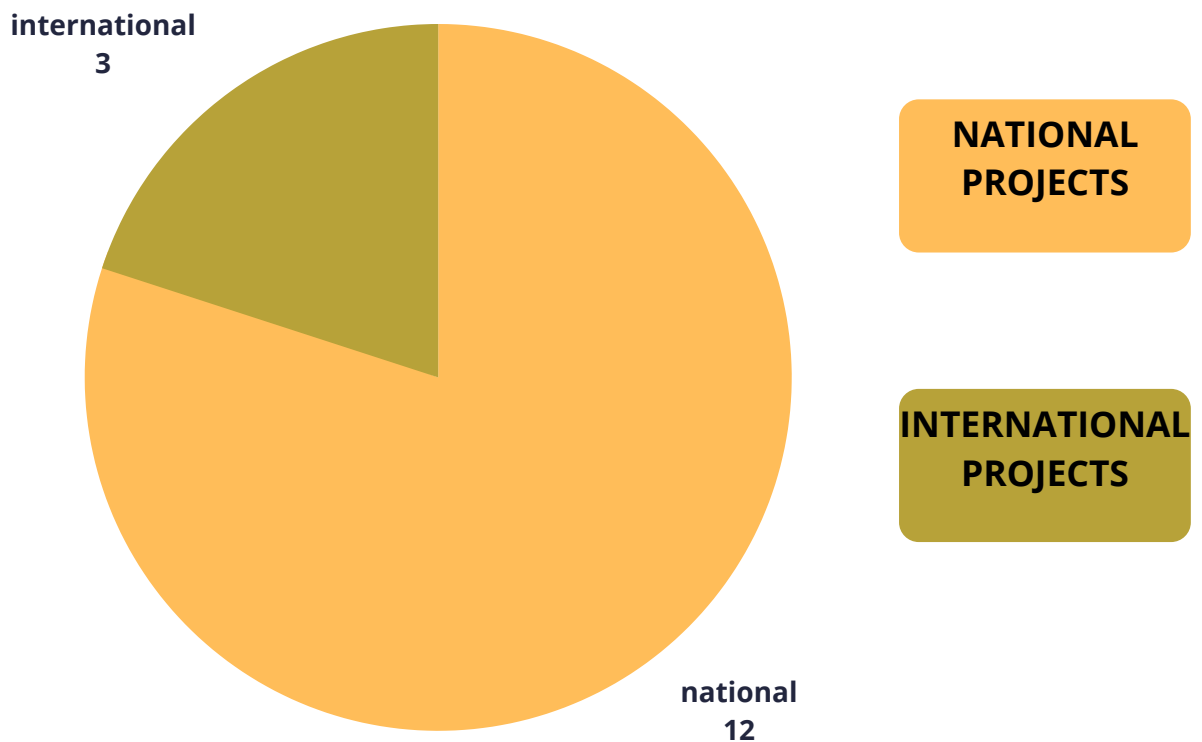


**Number of publications in 2021, by departments**

## PROJECTS

Aiming to be a pioneer in country's sustainable development, Solar Energy Institute has always been pushing graduate students to involved in research projects. In order to maximize the outputs of their effort, facilities and laboratories in our building are readily rearranged with brand new periodic research projects.

Most of these projects are founded by national resources. However, in the near future, potential European Union collaboration projects will likely arise in after-covid era.



## 2021 ongoing projects of EUSOLAR

# MILESTONES

## LIST OF PROJECTS

Project Coordinator: Hasan Sarptaş

**Development of Pressurized Coal, Biomass and Biochar Combustion Technologies in Oxygen-Rich Environment - TUBITAK 1003**

Project Coordinator: Neslihan Çolak Güneş

**Design and Experimental Examining of a Hybrid Food Dryer System that Used with Photovoltaic/Thermal (PV/T) System and Heat Pump - TUBITAK 1001**

Researcher: Neslihan Çolak Güneş

**Design and Performance Assessment of Sunlight Simulated and Photovoltaic Assisted Drying System - TUBITAK 1002**

Project Coordinator: Hayati Olgun

**Design of a Product for SUBSTITUTION of Phosphate Rocks- ERA-NET 2**

Project Coordinator: Burak Gültekin

**Synthesis of Undoped Benzoselenidiazole Derived Polymers for High Efficiency and Stable Perovskite Solar Cells and Their Device Applications as HTM - TUBITAK 1003**

Researcher: Ceylan Zafer

**Development of New Perylene Diimide Derived Electron Carriers with Different Molecular Conformations for Perovskite Solar Cells- TUBITAK 1001**

Researcher: Ceylan Zafer

**Polyoxometalate Based Perovskite Solar Cell Production - TUBITAK 1001**

Project Coordinator: Hayati Olgun

**Heating Induced Air Pollution Regulation Project - T.C. Environment and Urban Ministry**

Project Coordinator: Ceylan Zafer

**Production and Characterization Infrastructure Development of Next Generation Photovoltaics - T.C. Ministry of Development**

Project Coordinator: Melih Soner Çeliktaş

**Recycling of Crystalline Silicon Photovoltaic Panels via Life Cycle Analysis - TUBITAK 1001 - Under Contract**

Project Coordinator: Hayati Olgun

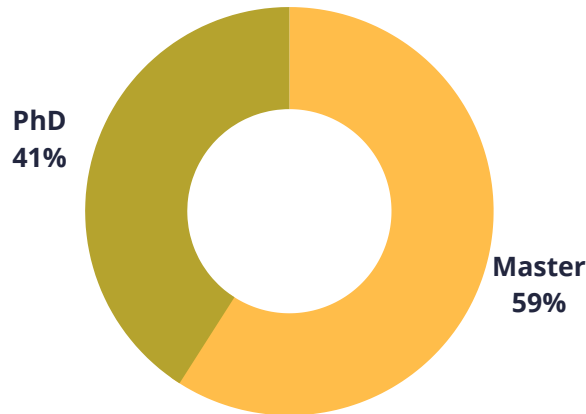
**PHIGO/Thermal Processing of P-rich Ashes Aiming for a High-Grade Phosphorus - ERA-NET 3 - Under Contract**

Project Coordinator: Hayati Olgun

**Developing Pelletizing and Pyrolysis Process of Spent Coffee Grounds and Spent Tea Wastes for Solid Fuel and Soil Improver - Under Contract - Dual Project Support (TUBITAK 2525)**

## Number of Students

**Master.....111**  
**PhD.....77**

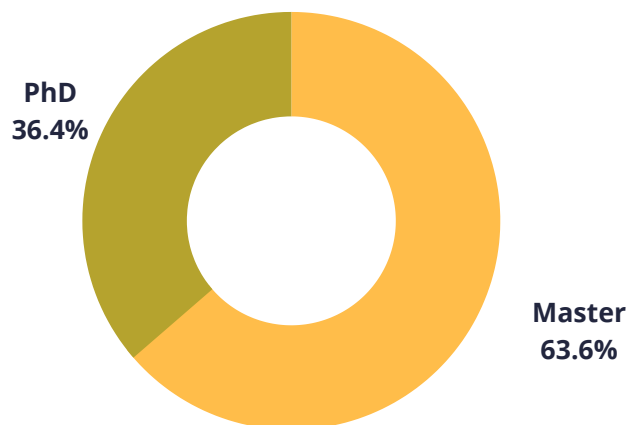


**There were:**  
**111 students and**  
**7 alumnis**  
**in Masters Program,**

**77 students and**  
**4 alumnis**  
**in PhD Program**  
**2021**

## Number of 2021 Alumni

**Master.....7**  
**PhD.....4**



# INFRASTRUCTURE



**Multiscale Glovebox**

**Class 1000  
Clean Room**



**Characterization Lab**



## Concentrated Solar Power System



## Geothermal Greenhouse



## Experimental Rooftop Photovoltaic System



# INFRASTRUCTURE



## Chemistry Lab

## Advanced Smart Biomaterials Lab



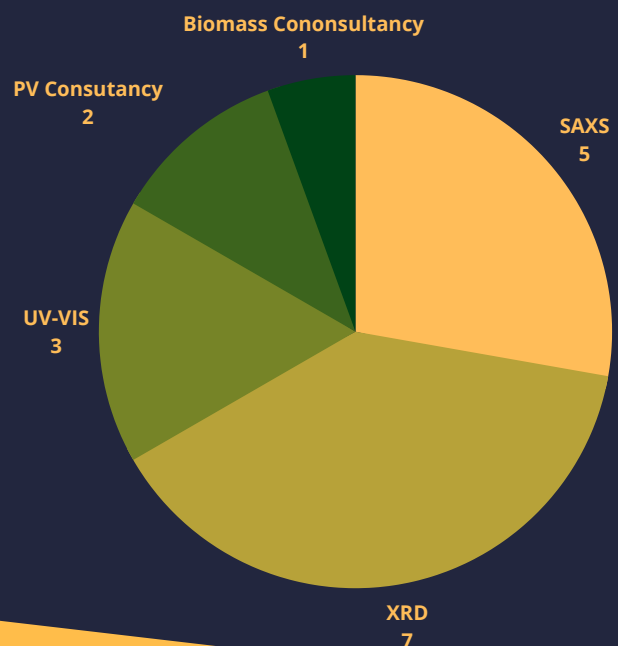
## Food Drying Lab

As a graduate research establishment of engineering and science, Solar Energy Institute always looks forward to getting in touch with industrial associations. Academic knowledge and engineering experience of our staff, linked with installed laboratories, have the capability to examine nearby plants and projects. Hence, 18 total analysis and consultancy projects were driven by the Solar Energy Institute in 2021.

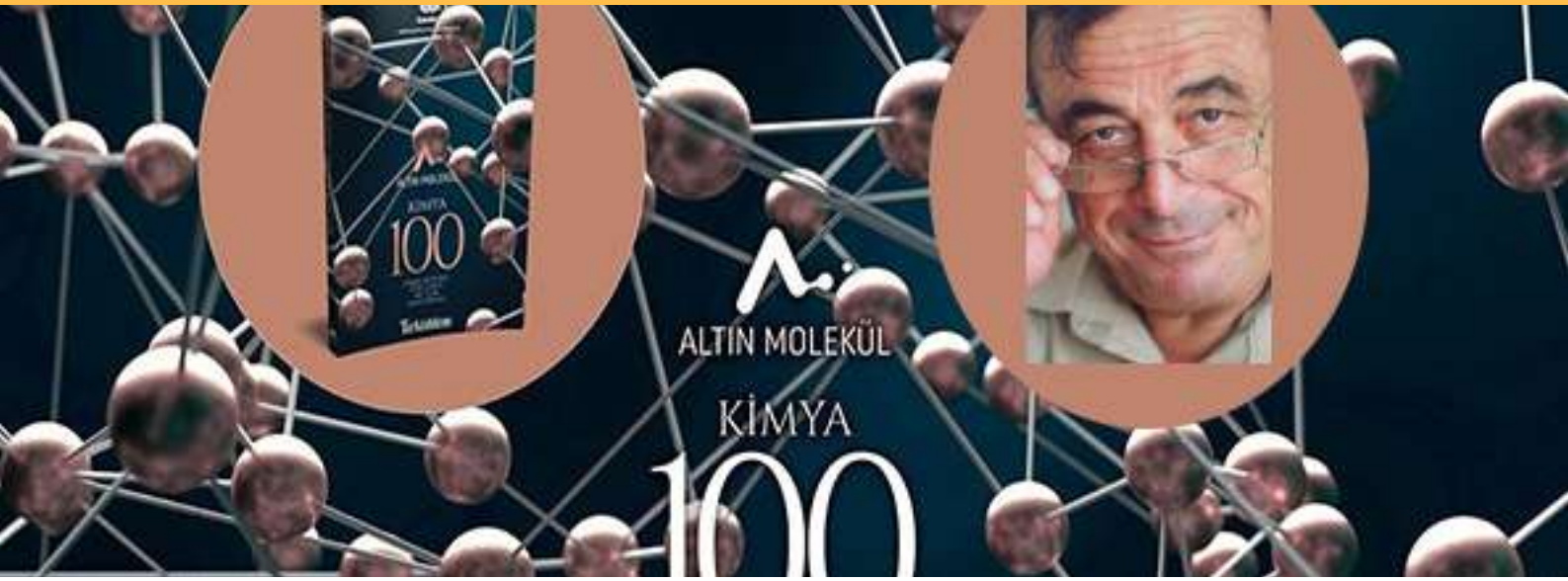
## ANALYSIS CARRIED OUT BY EUSOLAR IN 2021

- 5 Small Angle X-Ray Scattering
- 7 X-Ray Diffractometry
- 3 Ultraviolet – Visible – Near Infrared Spectroscopy
- 2 Solar Power Plant Examination & Consultancy
- 1 Biomass Consultancy

## ANALYSIS CARRIED OUT BY EUSOLAR IN 2021







## Altın Molekül (Golden Molecule) Awards

One of our past chairs Prof. Dr. Siddık İli was qualified to be amongst the “100 Turkish Scientists Leading in Chemistry Science” by Altın Molekül (Golden Molecule) Awards. We sincerely congratulate our dearest professor.

The report named “100 Turkish Scientists Leading in Chemistry Science” carried out by the Turkishtime, led by Chemistry Department of Hacettepe University and TÜBA full member Prof. Dr. Adil Denizli, has brought many prominent chemists together. For the evaluation, academic criteria such as the h-index, field of interest, contribution to science and humankind, awards and patents were taken into consideration along with characteristics as being an inspiration to future scientist and being able to establish a connection with the industry of chemistry. The ranking was made regarding the h-index of scholars.



## Our students came in first place at the Ideathon of Clean Hydrogen!

We congratulate our students, F. Müge Alptekin, Merve Uyan and Dilvin Çebi, for their outstanding achievement in Turkey's first Clean Hydrogen Ideathon "BEST for Hydrogen", which was organized by Yaşar BTTO, İzmir Development Agency, Energy Industrialists and Businessmen Association, BEST For Energy and held between 23 - 24 October 2021 within Yaşar University about coming up with innovative ideas and applicable solutions in a thematic area. In addition, we would like to thank all our dear friends who took part in the organization and conduct of this event, as well as Ms. Enis Fakıoğlu and Ms. Selmiye Alkan Gürsel, who mentored the HydroS team during the event.



## Poland Study Visit in Warming Project

On behalf of the Ministry of Environment, Urbanization and Climate Change, our Institute faculty members Prof Dr Hayati Olgun, Dr Hasan Sarptaş, Dr Özben Kutlu, within the scope of the Heating-Induced Air Pollution Management Project, carried out by the Ministry experts and the Ege University team, a visit to Poland was made between 28 November 2021 and 4 December 2021.

During the study visit, the topics of air pollution management and Polish energy policy and legislation on district heating in Poland were discussed with the Polish Ministry of Climate and Environment and Energy Regulatory Office (URE). Also, Polish district heating potential, current situation and the difficulties in the heating sector were discussed with the Polish District Heating Commerce (IGCP), All aspects of the district heating sector in Poland with the Polish Energy Group, and district heating systems and heat networks with Veolia, were discussed. In addition, the Waste Incineration Plant of PGE in Rzeszów was visited.





## We held our 2021 career planning event.

As a part of career planning activities, on December 29, 2021, at 17.00, for an online seminar led by our institute director, Professor Dr. Ceylan Zafer Hoca, we have hosted Vahit Kaya from Orbit Energy. In his presentation titled "Energy Transformation in the World and Our Position", Mr. Kaya shared his career journey and experiences, and made recommendations regarding the developments in the industry and possible job opportunities in line with these developments. The presentation, which was open to Ege University employees and students, was watched with interest for more than an hour with the questions of the participants. We would like to thank Mr. Kaya for making this beautiful presentation.



# SOCIAL MEDIA

FOLLOW US..



Institute Facebook account existed but LinkedIn, Instagram, Twitter and Youtube accounts were started in May 2021.

Starting in the second half of the year 2021, Facebook, LinkedIn and Twitter are actively used to make announcements of seminars/webinars given by the students. Organizations related to the Career Planning Center of Ege University were also published on the pages. Useful general information provided by the university such as trainee programs/fairs, graduate program and graduate card applications were shared. Ege News Agency was followed and the news about the institute were shared with the followers.

In the forthcoming years, it is planned that the institute social accounts will have a broader content such as information about the ongoing projects, announcements of scientific and social events organized by the institute, details about the visits to or collaborations with other institutions in Turkey or abroad. Youtube broadcasting is on agenda, as well. It is aimed to rebuild the connection with alumni and make the institute more visible in the renewable energy world.

# SOCIAL MEDIA



## MASTER THESIS

**Fuzzy logic control for two axis sun tracking system of photovoltaic panels**

Writer: Abdi Şenol

Supervisor: Prof. Dr. Orhan Ekren

**Estimation of annual daylength and energy expenses of cities in the Aegean Region**

Writer: Oğulcan Genç

Supervisor: Prof. Dr. Önder Özgener

**Design and performance evaluation of a direct absorption solar collector**

Writer: İsmail Paçacı

Supervisor: Assoc. Prof. Dr. Koray Ülgen

**Evaluation of performance-based architectural design using building information modelling**

Writer: İdil Boyacıoğlu

Supervisor: Assoc. Prof. Dr. Koray Ülgen

**Sustainability analysis of a solar assisted organic olive oil production facility**

Writer: Faruk Öner

Supervisor: Asst. Prof. Dr. Neslihan Çolak Güneş

**The synthesis and characterizations of metal oxide structures in different morphological structures, the research of their usage in organic light-emitting diodes and dye sensitized solar cells**

Writer: Şerefcan Bektaşer

Supervisor: Prof. Dr. Şule Erten Ela

**A Strategic Approach to Energy-Efficient Building Design Based on Climatic Parameters**

Writer: Ceren Limon

Supervisor: Assoc. Prof. Dr. Koray Ülgen

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## PHD THESIS

**Investigation of the degradation mechanisms in perovskite solar cells and stability improvement**

Writer: Adem Mutlu

Supervisor: Prof. Dr. Ceylan Zafer

**Optimization of a stand-alone PV system feeding a 1kW value asynchronous motor by digital compensation way**

Writer: Altan Kalay

Supervisor: Assoc. Prof. Dr. Koray Ülgen

**Supercapacitors based on nanocarbon electrode and polymer jel electrolyte**

Writer: Şirin Siyahjani Gültekin

Supervisor: Prof. Dr. Canan Varlıklı



# MASTER SEMINARS

Speaker: İdil Boyacıođlu

Supervisor: Assoc. Prof. Dr. Koray Ülgem

**Energy Savings in Buildings of BIM Technology**

Speaker: Ceren Limon

Supervisor: Assoc. Prof. Dr. Koray Ülgem

**A Strategic Approach to Energy Efficient Building Design Based on Climatic Parameters**

Speaker: Berkan Polat

Supervisor: Assoc. Prof. Dr. Koray Ülgem

**Parametric Design and Energy Efficiency for Buildings**

Speaker: Burak Ően

Supervisor: Prof. Dr. Őule Erten Ela

**Investigation of the Effects of Spin Surface Coating Velocities on Yield Perovskite Cells**

Speaker: İrem Cengiz

Supervisor: Assoc. Prof. Dr. Numan Sabit Çetin

**Thematic Wind and Solar Maps**

Speaker: Ahmet Cengiz

Supervisor: Prof. Dr. Őule Erten Ela

**RC Solar Powered Model Airplane Using Attiny85 Microprocessor Instead of Battery Or Capacitor**

Speaker: Ali Çakmak

Supervisor: Prof. Dr. Őule Erten Ela

**Wearable Solar Technologies and Sensor & Software Infrastructure**

Speaker: Hande Demiröz

Supervisor: Assoc. Prof. Dr. Numan Sabit Çetin

**Efficiency of Maximum Power Point Tracker in Photovoltaic Power Systems**

Speaker: Burçin AkŐahan

Supervisor: Asist. Prof. Ahmet EryaŐar

**Feasibility Study of a Biogas Production Facility for Rural Area**

2021  
SEMINARS

### **MASTER SEMINARS**

Speaker: Gürhan Dedeköy

Supervisor: Assoc. Prof. Dr. Mete Çubukçu

**Technical and Economic Analysis of a Photovoltaic Power System Supported Heat Pump Application**

Speaker: Ece Metin

Supervisor: Asist. Prof. Ahmet Yılandı

**Economic Analysis of a Rooftop Photovoltaic Power System**

Speaker: Başak Turgut

Supervisor: Asist. Prof. Burak Gültekin

**Annealing of Perovskite Thin Films with Light, Investigation of Crystal Kinetics and Photovoltaic Performances**

Speaker: Dilek Çırak

Supervisor: Asist. Prof. Burak Gültekin

**Increasing Stability of Perovskite Starting Solution by Doping**

Speaker: Burak Akhanca

Supervisor: Prof. Dr. Mustafa Güneş

**An Overview of Software Used in Solar and Wind Systems Design**

Speaker: Yusuf Kaan Yıldız

Supervisor: Prof. Dr. Mustafa Güneş

**A Study on Transfer Functions of Solar Energy Systems**

Speaker: Kadriye Avcü

Supervisor: Prof. Dr. Orhan Ekren

**Photovoltaic Power Systems Design Calculations and Current Legislation Analysis**

Speaker: Tugay Hoşbak

Supervisor: Prof. Dr. Orhan Ekren

**Innovative Methods in Heating Cooling Hot Water Production**

Speaker: Hazal Karadadaş

Supervisor: Assoc. Prof. Dr. Mete Çubukçu

**Comparison of Green Building Rating System in Turkey and International Systems**

Speaker: İlker Turp

Supervisor: Assoc. Prof. Dr. Mete Çubukçu

**Energy Storage Techniques and Applications Used in Electric Vehicles**

# MASTER SEMINARS

Speaker: Oğuzhan Baylan

Supervisor: Prof. Dr. Orhan Ekren

**Usage of Renewable Energy in Air Conditioning**

Speaker: Kaan Arslan

Supervisor: Prof. Dr. Orhan Ekren

**"Machine Learning" and Data Analysis in the Renewable Energy Industry**

Speaker: Gizem Güler

Supervisor: Asist. Prof. Neslihan Çolak Güneş

**Energy Consumption Analysis and Determination of Improvement Methods in Flexible Packaging Production Processes**

Speaker: Hatice Arıcı

Supervisor: Asist. Prof. Burak Gültekin

**Naphthalene Diimide Based Acceptors for Organic Optoelectronic Systems**

Speaker: İlkay Balıkçı

Supervisor: Assoc. Prof. Dr. Mete Çubukçu

**Comparison of Life Cycles of Different Photovoltaic Modules**

Speaker: Mahmut Aslan

Supervisor: Assoc. Prof. Dr. Mete Çubukçu

**Thermal Management Systems for Lithium-Ion Batteries**

Speaker: Ecem Şen

Supervisor: Assoc. Prof. Dr. Melih Soner Çelikaş

**Energy Storage Applications with Phase Change Materials**

Speaker: İrem Özsevgin

Supervisor: Assoc. Prof. Dr. Melih Soner Çelikaş

**Hydrogen Storage Methods**

Speaker: Gamze Mersin

Supervisor: Assoc. Prof. Dr. Melih Soner Çelikaş

**Integration of Renewable Energy Systems: Recent Developments and Future Challenges**

Speaker: Esra Çiftçioğlu

Supervisor: Assoc. Prof. Dr. Melih Soner Çelikaş

**Patent Valuation: Method and Practices**

2021  
SEMINARS

### PHD SEMINARS

Speaker: Öznur Çanlı Gençer

Supervisor: Asist. Prof. Hasan Sarptaş

**Climate Change Modeling and Fields of Application**

Speaker: Rengin Sıki

Supervisor: Asist. Prof. Ahmet Eryaşar

**Using Fermented Fertilizer Obtained From Biogas Systems in Agricultural Activities**

Speaker: Arsen Sucu

Supervisor: Prof. Dr. Günnur Koçar

**Selection of the Most Appropriate Animal Waste Source Biogas Plant Location in a Geographical Information System Environment: The Case of Muğla Province**

Speaker: Semra Yılmaz

Supervisor: Asist. Prof. Bircan Dindar

**Synthesis of Doped Semiconductor Materials, Photophysical and Photocatalytic Performances**

Speaker: Damla Şahin

Supervisor: Asist. Prof. Bircan Dindar

**The Role of ZnO Composites in the Performance of Dye-sensitized Solar Cells**

Speaker: Turgay Kayan

Supervisor: Assoc. Prof. Dr. Mete Çubukçu

**Comparative Performance and Loss Analysis in Grid Connected Rooftop Photovoltaic Power Systems**

Speaker: Gökhan Devekıran

Supervisor: Assist. Prof. Hasan Sarptaş

**Evaluation of Ash from Biomass Combustion in a Fluidized Bed**

Speaker: Alper Ekici

Supervisor: Prof. Dr. Ceylan Zafer

**Large Area Production of Perovskite Type Solar Cells with Inkjet and Slot Die Techniques**

Speaker: Bahar Tosun Ercan

Supervisor: Prof. Dr. Ceylan Zafer

**Epoxy Based Ultraviolet and Visible Encapsulant Design to Improve Stability in Perovskite Type Solar Cells**

## PHD SEMINARS

Speaker: Oğuzhan Çimen

Supervisor: Prof. Dr. Canan Varlıklı

**Polymeric Encapsulation Material Synthesis and Characterization for Organic Photonic Systems**

Speaker: Aslı Birtürk

Supervisor: Prof. Dr. Orhan Ekren

**Patent Valuation: Sustainability Perspective in Recycling in Photovoltaic Panels**

Speaker: Mohammed Aldabbagh

Supervisor: Prof. Dr. Orhan Ekren

**Investigation of Renewable Energy Charging Stations for Electric Vehicles**

Speaker: Celal Hakan Canbaz

Supervisor: Prof. Dr. Orhan Ekren

**Investigation of Downhole Dynamics in Reservoirs Containing Carbon Dioxide**

Speaker: Tunahan Akış

Supervisor: Prof. Dr. Orhan Ekren

**Numerical and Analytical Modeling Methods in Solar Energy Systems**

Speaker: Cevat Mutlu

Supervisor: Prof. Dr. Orhan Ekren

**Investigation of the Effect of Climate Change on Heating-Cooling Loads**

Speaker: Adem Mutlu

Supervisor: Prof. Dr. Ceylan Zafer

**Investigation of Degradation Mechanisms in Perovskite Solar Cells and Increasing Stability**

Speaker: Yusuf Atalay

Supervisor: Assoc. Prof. Dr. Ahmet Yılcı

**Comparison of Low Power DC-DC Power Converters Used in Electric Vehicle Applications**

Speaker: Burak Kahraman

Supervisor: Assoc. Prof. Dr. Ahmet Yılcı

**Applications of Machine Learning Based PV Power Systems**

2021  
SEMINARS



# COURSES

## Fall Term Master Courses

### ENERGY TECHNOLOGIES

- Renewable Energy Fundamentals
- Solar Energy Fundamentals
- Geothermal Energy Fundamentals
- Biomass Energy
- R&D Based Energy Investments
- Wind Energy Fundamentals
- Solar Collectors
- Electrical Machines Used in Wind Energy Cycle Systems I
- Exergy Analysis of Renewable Energies I
- Renewable Energy Applications of Geographic Information Systems
- Reliability of Photovoltaic Power Systems
- Fundamentals of Energy Systems
- Solar Electricity I
- Development Economics
- Underground Heat Exchangers Design

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### ENERGY

- Introduction to Energy Conversion Systems
- Sustainable Production in Industry I
- Laboratory Techniques
- Chromatographic Separation Techniques in Structure Determination
- Photodegradation Mechanisms of Organic Compounds - I
- Organic Chemistry Basic Terms & Basic Definitions for Organic Electronic Technologies
- Analysis of Thermal Systems
- Introduction to Solar Radiant Photophysics-Photochemistry I
- Introduction to Solar Radiation Photophysics-Photochemistry
- Structural Description by Spectroscopic Methods I
- Evaluation of Energy Investment Projects
- Solar Drying Technology
- Structural Description Application by Spectroscopic Methods I
- Introduction to Inorganic Nanoparticles and Semiconductor Quantum Dots
- Flexible and Lightweight New Generation Polymer Solar Cells
- Scientific Research Approach and Ethics

## **ENERGY TECHNOLOGIES**

- Energy Efficiency in Buildings
  - Energy Conservation in Buildings
  - Biogas Production Technologies I
  - Wind Energy Conversion Systems I
  - Exergy Applications of Major Thermal and Chemical Processes
  - New Generation Photovoltaic Technologies
  - Renewable Energy Technologies
  - Energy Policies
  - Electrical Energy Storage Systems
- 

## **ENERGY**

- Electrochemical Energy Storages
- Chemistry of Semiconductors
- Macromolecules for Nanoscience-Nanotechnology
- Organic Optoelectronic Materials-I
- Field Effect Transistors (FETs, MOSFETs, OFETs, photOFETs)
- Solar Photochemistry
- Computational Heat Transfer - I
- Renewable Energy Applications
- Scientific Research Approach and Ethics
- Conjugated Polymers and Photonics Applications

# **COURSES**

Fall Term Phd Courses

# COURSES

## Spring Term Master Courses

### **ENERGY TECHNOLOGIES**

- Renewable Energy Fundamentals
  - Automatic Control in Solar Energy Systems
  - Use of Renewable Energy Resources in Agriculture
  - Performance Review of Photovoltaic Power Systems
  - Biorefinery Applications
  - Electrical Machines Used in Wind Energy Cycle Systems II
  - Energy Management in Buildings
  - Solar Electricity II
  - Wind-Photovoltaic Hybrid Power Systems
  - Technology Foresight
  - Energy Recovery from Urban Solid Waste
- 

### **ENERGY**

- Introduction to Energy Conversion Systems
- Solar Thermal Applications
- Design Principles of Solar Thermal Systems II
- Sustainable Production in Industry II
- Solar Radiation Chemical Production
- Hydrogen Energy and Technologies
- Life Cycle Analysis of Renewable Energy Systems
- Fullerenes, Carbon Nanotubes and Applications
- Solar Cooling
- Structural Description by Spectroscopic Methods I
- Applications of Inorganic Nanoparticles in Photovoltaic Systems
- Structural Description Application by Spectroscopic Methods I
- Introduction to Solar Radiation Photophysics-Photochemistry Practice
- Flexible and Lightweight New Generation Polymer Solar Cells
- Scientific Research Approach and Ethics

## ENERGY TECHNOLOGIES

- Organic Semiconductor Based Photovoltaic Systems
  - Heat Pumps and Applications
  - Geothermal Energy Applications
  - Bioenergy Production and Applications
  - Energy-Environment Relationship, Energy Efficiency and Planning
  - Biofuels
  - Energy Economics
  - Biogas Production Technologies II
  - Wind Energy Cycle Systems II
  - Renewable Energy Technologies
  - Solar Architecture
  - Sustainable Energy and Climate Action Plan Preparation Techniques
- 

## ENERGY

- Liquid Crystal Organic Materials
- Chemistry of Semiconductors
- Photodegradation Mechanisms of Organic Compounds - II
- Electrochemistry of Organic Compounds
- Organic Materials in Photoelectronic Technologies
- Renewable Energy Applications
- Computational Heat Transfer - II
- Graphene and Graphene Oxides: Electronics/Optoelectronics Applications
- Nanotechnology and Sustainability: Energy Conversion and Storage

# COURSES

Fall Term Phd Courses

# NEWCOMERS OF 2021

## Prof. Dr. Engin Karatepe

Engin Karatepe received the B.Sc. degree from the Gaziantep University, Turkey, in 1995 and the M.Sc. and Ph.D. degrees from Ege University, Izmir, Turkey, in 2000 and 2006, respectively. He was a Postdoc Fellow in the Department of Computer Science and Electrical Engineering, Kumamoto University, Japan, in 2007. His research interests include photovoltaic power systems, network integration of distributed generation, electrical power system planning, and intelligent systems applications to operation and control of renewable energy systems.



## Dr. Halide Diker

Halide Diker, received her BSc degree in Chemistry Department at Ege University in 2008 and completed her MSc (2011) and PhD (2017) at Solar Energy Institute of Ege University. Between 2011 and 2016, she acted as an R&D Engineer in DYO Paints Manufacturing and Trading Company Inc., than she worked as a Post-Doc Researcher in quantum dot manufacturing project funded by TÜBİTAK between 2017-2020. Her research interests include advanced material technologies for photonic applications of light emitting diodes and solar cells.



## Research Assistant Özkan Nuhoğlu

Özkan Nuhoğlu received the B.Sc. degree from Istanbul Technical University Mechanical Engineering Faculty. Later on, he has taken master courses from ITU Energy Institute and Boğaziçi University Mechanical Engineering Department. He is a master student of Solar Energy Institute. His research areas include Thermodynamics, Heat Transfer, Geothermal Energy and Energy Recovery.



## Research Assistant Harun Gümüş

Harun Gümüş received the B.Sc. degree from the Atılım University, Turkey, in 2017 and the M.Sc. degrees from Ege University, Izmir, Turkey, in 2020. He has taken PhD courses from Ege University Solar Energy Institute. He is a PhD candidate of Solar Energy Institute. His research interests include photovoltaic power systems and energy storage systems for renewable energy.



## Institute Secretary Gültekin Özgür

Gültekin Özgür received his bachelors degree from Dokuz Eylül University Business Management School in 1989. He has been working for Ege University from 1993 to now, with various administrative positions.



# IN MEMORY OF...

## Prof. Dr. Metin olak (1942-2016)

olak was born in 1942 in Istanbul. He completed his undergraduate (1966) and master's (1969) studies at the Electrotechnical Faculty of Darmstadt Technical University in Germany. He worked as a director (1975-1984) in the firm of Kula Mensucat Fabrikası A.Ş. which was one of the important enterprises of its period in İzmir. He completed his PhD in Ege University's Faculty of Engineering (1977). He received the titles of Associate Professor (1989) and Professor (1995) at Ege University. He was appointed as the founding head of the Department of Electrical and Electronics Engineering at Ege University (1994) and continued this duty until 2006. He served as the Dean of the Faculty of Engineering at Ege University (1997-2000). olak was awarded the "Federal Germany Presidential Merit Award" in 2003.



Ege University Solar Energy Institute has an important role in olak's academic career. He served as Deputy Director of the Institute (1992-1995), Head of the Department of Energy (1986-2002), Head of the Department of Energy Technology (2002-2006) and a member of the Board of Directors for a long time. Under his supervision, 19 master's and 17 doctoral dissertations were completed.

olak trained dozens of experts in the private and public sectors in the renewable energy sector, especially in photovoltaic solar energy. Among his graduates, there are also academicians who continue to work at the institute today.

olak passed away on November 27th, 2016.

We commemorate Metin olak who was one of the institute's veteran professors with longing and respect.



