SABANCI UNIVERSITY

Faculty of Engineering and Natural Sciences

ANNUAL REPORT
2018-2019
ACADEMIC YEAR
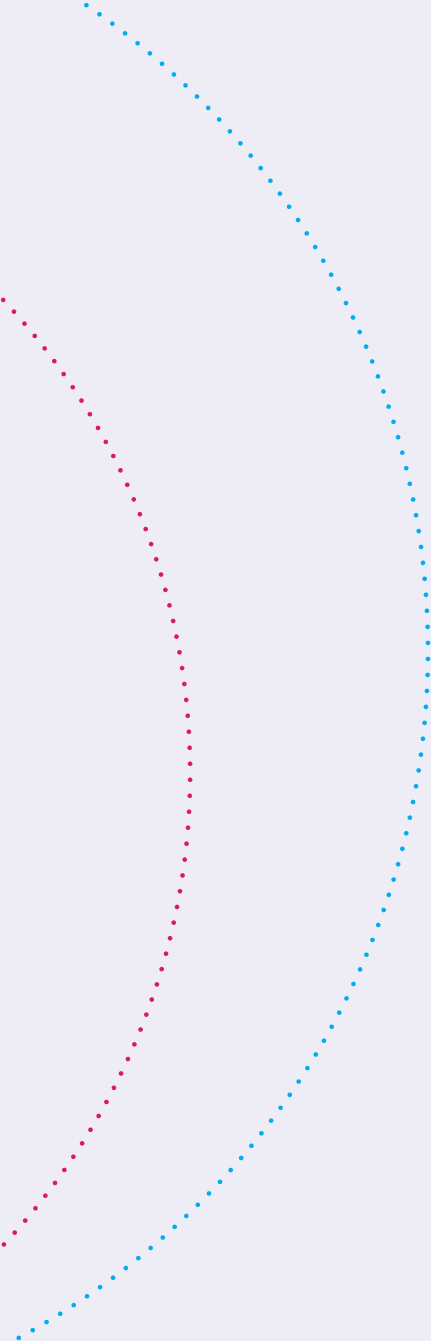
Sabancı Universitesi

FACULTY OF
ENGINEERING AND
NATURAL SCIENCES

Dean's Message

Welcome to the new edition of the Annual Report of our Faculty of Engineering and Natural Sciences (FENS). We have had our hands full, with exciting developments in all dimensions of undergraduate and graduate education, research and outreach activities. This report will display some of the many stories we have celebrated in the FENS building throughout the year, and as always, we invite you to visit the FENS web pages as well as those of the individual programs to share all our accomplishments. This year we have started a dynamic twitter account @fenssabanci whereby you can touch-base with our daily activities.

FENS boasts to serve three quarters of the student body of Sabancı University. Our programs are well-established and are recognized at top institutions around the world where our graduates are regularly offered MS and PhD studentships. Meanwhile, SU alumni in academia have expanded once again this year; many of them are women, abolishing the prejudiced idea that science and engineering degrees offer careers tailored for men (page 34-35). We ourselves proudly contribute to reverse brain drain in Turkey; in the 2018-19 academic year, 7 full-time faculty members have joined FENS; you can read their stories on pages 7-8-9. We were, however, extremely saddened by the sudden loss of our dear Emeritus Faculty member Yuda Yürüm in April 2019 (page 43).

The impact of our faculty in the scientific literature continues to increase. In fact, the number of citations to manuscripts having FENS address has exceeded 60000, and the h-index of the faculty as a whole has hit 100! In parallel with this development, the sponsored research volume brought into the SU climate by FENS members has continued to climb. Over the next few years, I am confident that we will be seeing more of the impactful results emerging from research carried out in our faculty, with an ever-expanding collaborative network spanning many countries (page11-12-13)! A glimpse into these exciting developments, centered on the research of two of our faculty members, appear on pages 20-26 of this report.

In this report, you will also find the many ways we celebrate the undergraduate and graduate students who contribute substantially in our research generation: Our very successful **Industry Focused Projects** (Sanayi Odaklı Projeler, dubbed SoP) continued into its fourth year, our faculty members offered the largest number of projects to the **Program for Undergraduate Research (PURE)**, the **Three Minute Thesis (3MT) Competition** recognized graduate students who could best communicate their findings in a limited amount of time, and the **Gürsel Sönmez Thesis Award** honored the most impactful of the recent dissertations.
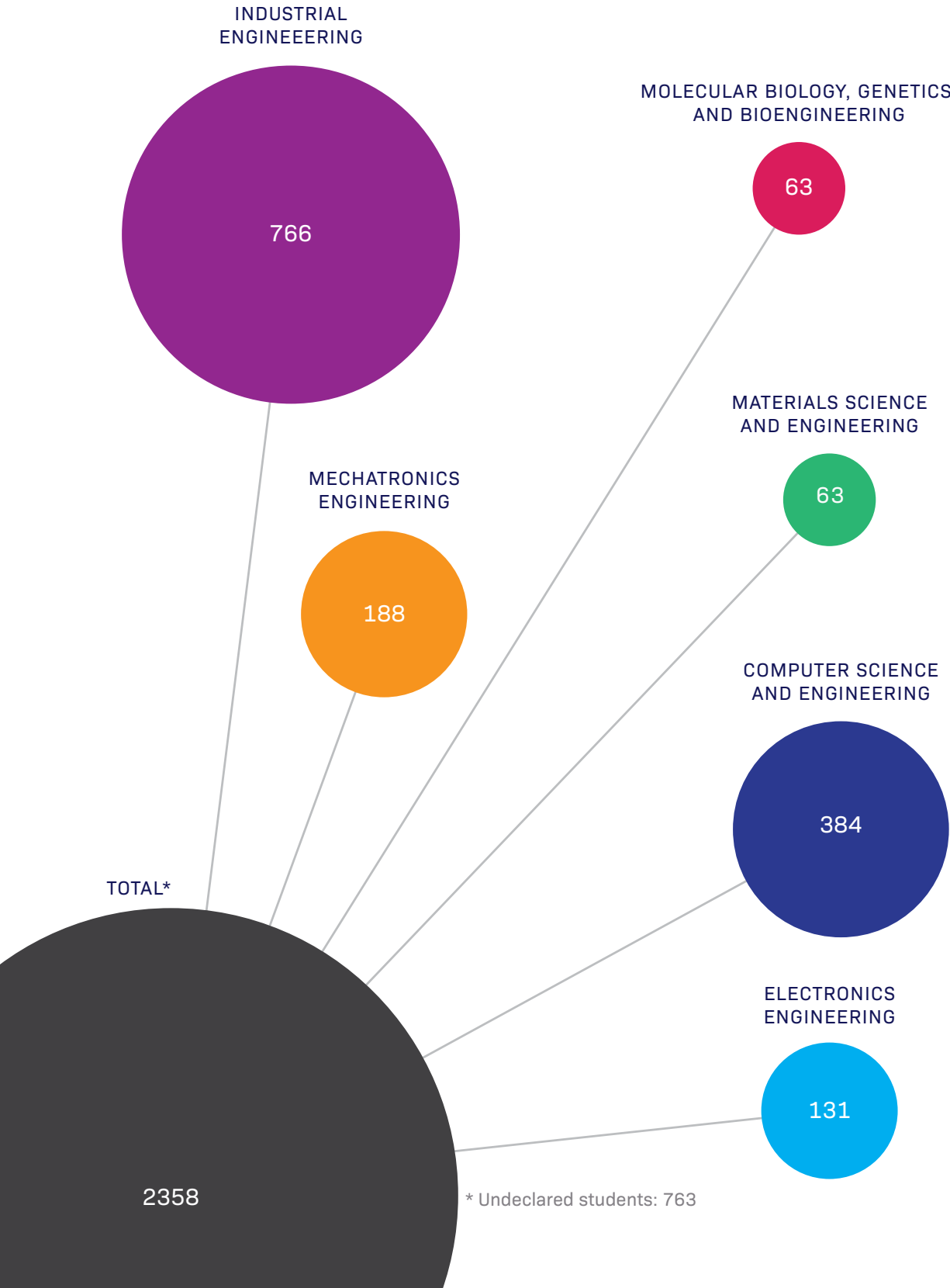
Here at FENS, we continue to pursue our motto, Creating and Developing Together. To commemorate our founding president Tosun Terzioğlu, we have named our new high-performance computing cluster installed in June 2019 "**toSUn**" (). We hope this will put a smile on the faces of all our stakeholders who run computing jobs on the cluster every time they login to **toSUn**.

With the investments we make into human capital, the care we give to all our stakeholders, and the close watch we keep on the academia related developments all over the World, we are confident that we will continue to be the pioneering Faculty of Engineering and Natural Sciences in Turkey. We invite you to join us in spreading the word on how the diverse and creative activities conceived here contributes to placing Sabancı University amongst the top academic institutions in the world.
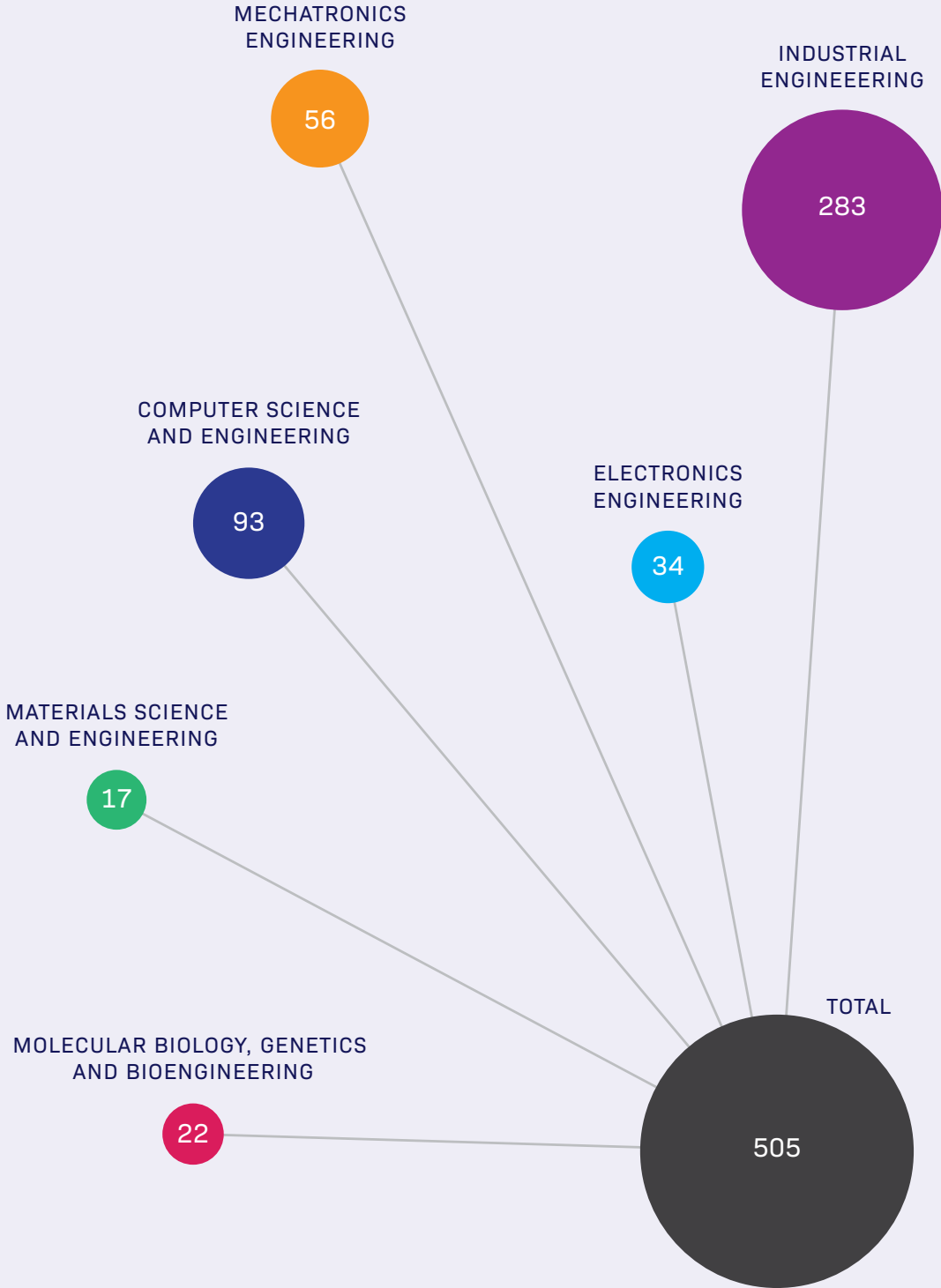
— *Canan Atılgan*

Here at FENS, we continue to pursue our motto, Creating and Developing Together.

Student Numbers

Undergraduate Student Enrollment 2018–2019

INDUSTRIAL
ENGINEEERING

766

MOLECULAR BIOLOGY, GENETICS
AND BIOENGINEERING

63

MECHATRONICS
ENGINEERING

188

MATERIALS SCIENCE
AND ENGINEERING

63

COMPUTER SCIENCE
AND ENGINEERING

384

TOTAL*

ELECTRONICS
ENGINEERING

131

2358

* Undeclared students: 763

Undergraduate Student Alumni 2018–2019

MECHATRONICS
ENGINEERING

56

INDUSTRIAL
ENGINEEERING

283

COMPUTER SCIENCE
AND ENGINEERING

93

ELECTRONICS
ENGINEERING

34

MATERIALS SCIENCE
AND ENGINEERING

17

TOTAL

505

MOLECULAR BIOLOGY, GENETICS
AND BIOENGINEERING

22

Student Numbers

Graduate Student Enrollment 2018–2019

MS   PhD

Program	
COMPUTER SCIENCE & ENGINEERING	
ELECTRONICS ENGINEERING	
INDUSTRIAL ENGINEERING	
MANUFACTURING ENGINEERING	
MATERIALS SCIENCE & ENGINEERING	
MATHEMATICS	
MECHATRONICS ENGINEERING	
MOL. BIO., GENETICS & BIOENGINEERING	
PHYSICS	
CYBER SECURITY	
DATA ANALYTICS	
ENERGY TECHNOLOGIES & MANAGEMENT	
INFORMATION TECHNOLOGY	

Non-Thesis Master's Programs

171

213

0 10 20 30 40 50 60 70

Graduate Student Alumni 2018–2019

Program	
COMPUTER SCIENCE & ENGINEERING	
ELECTRONICS ENGINEERING	
INDUSTRIAL ENGINEERING	
MANUFACTURING ENGINEERING	
MATERIALS SCIENCE & ENGINEERING	
MATHEMATICS	
MECHATRONICS ENGINEERING	
MOL. BIO., GENETICS & BIOENGINEERING	
PHYSICS	
CYBER SECURITY	
DATA ANALYTICS	
ENERGY TECHNOLOGIES & MANAGEMENT	
INFORMATION TECHNOLOGY	

Non-Thesis Master's Programs

50

32

0 10 20 30 40 50 60 70

Newcomers

7 new faculty joined FENS to bring the full time total to 110.

Reyyan Yeniterzi
COMPUTER SCIENCE AND ENGINEERING

Reyyan Yeniterzi is a faculty member in the Computer Science and Engineering Program. She received both her BSc and MSc degrees in Computer Science and Engineering from Sabancı University. She earned another MSc and her PhD degree from Carnegie Mellon University, School of Computer Science, Language Technologies Institute. After her PhD, she started working at the Computer Science Department of Özyeğin University as a faculty member. In June 2019, she moved to the Computer Science and Engineering Program of the Sabancı University. During her studies, she worked as a visitor researcher at the International Computer Science Institute (ICSI), Vanderbilt and Qatar Carnegie Mellon Universities and did an internship at Google. Her main research interests include Natural Language Processing, Deep Learning, Text Mining, Search Engines, Information Retrieval and Extraction.

Cavit Ağca
MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING

Dr. Agca received his BS in Molecular Biology and Genetics from Bogazici University in 2002. Later, he studied Nodal and Redox signaling during sea urchin development at Louisiana State University, Health Sciences Centre, New Orleans. He earned his Ph.D. in Developmental Biology at New Orleans in 2008.

Dr. Agca have a long term interest in visual systems and several aspects of associated molecular mechanisms. During his Ph.D., he also worked under the supervision of Dr. William H. Klein in the Department of Biochemistry and Molecular Biology, at the University of Texas, M.D. Anderson Cancer Center on the Sea Urchin Genome Project (SUGP). As a part of the SUGP, he studied the sea urchin orthologs of mammalian retinal genes and he elucidated their expression pattern in early embryos and adult tube feet. He continued to work in Dr. Klein`s lab as a postdoc on evolutionary perspectives of vision. During that period, he characterized different properties of sea urchin visual system and generated a knock-in mouse model that utilizes a sea urchin pou4f1/2 instead of the mouse Pou4f2 that is crucial for retinal ganglion cell (RGC) development and survival.

Afterwards, he worked under the supervision of Dr. Christian Grimm in the Department of Ophthalmology, at the University of Zurich. His main focus was to identify the mechanisms related to endogenous neuroprotection in the retina, specifically Leukemia Inhibitory Factor (LIF) that is expressed in muller cells. He showed that P38 MAPK signaling regulates Lif expression and is crucial for neuroprotection of photoreceptors. Related to those findings, he discovered another aspect of Lif expression, which is the cis-regulation of Lif mRNA stability in muller cells. Lif is regulated post-transcriptionally by AU-rich elements within its 3`UTR. More interestingly, he identified redox signaling as the main regulator in this mechanism which was a key finding connecting redox signaling and neuroprotection in retina. This work was awarded Ophthaward 2016 for Jury`s choice prize, a highly prestigious ophthalmology award in Switzerland.

Dr. Agca has also been interested in the translational research on retinal disorders. After his studies in Zurich, he accepted the invitation from Dr. Martin Zinkernagel in the Department of Ophthalmology at the Inselspital, Bern to work on retinal vein occlusion models. Dr. Agca has shown that regional ischemia results in occupation of non-native immune cells (transplanted Cxcr3-GFP+ bone marrow cells) and leads to regional inflammation. During his study at Inselspital, he also initiated a study deciphering the dedifferentiation capacity of Muller cells together with Dr. Markus Tschopp. Since then, he is continuously working on molecular aspects of retinal regeneration in mammalians.

Newcomers

On October 2014, he moved to Basel to work with Dr. Albert Neutzner at University Hospital Basel on a novel retinal gene therapy targeting OPA1 gene in Autosomal Dominant Optic Atrophy (ADOA). As a study director, he supervised and performed animal experimentation for in vivo evaluation of retinal gene therapies for OPA1 haploinsufficiency. Since 2019 September, he is in Sabanci University as a faculty member. He is now establishing a research program regarding gene therapy applications and regenerative approaches in mammalian retina using adeno-associated virus (AAV) and artificial trans-activators/inhibitors (ATA/ATI).

Emrah Eroğlu
MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING

Emrah Eroğlu is a faculty member in the Molecular Biology, Genetics and Bioengineering program. He first started a career as a carpenter and handcrafted furniture for many years out of raw wood until he developed a deep interest in nature. This led him to study biology at the Vienna University (2007). Being fascinated from the chemistry of life, he continued his masters in Technical Chemistry and Bioanalytics at the Vienna University of Technology (2012). On top of that, he started studying Medicine at the Medical University of Graz where he did also his PhD in Molecular Medicine (2013). Having earned his graduation from the Graier & Malli lab and gained expertise in the development of genetic probes and live-cell imaging, he continued his postdoctoral studies in the laboratories of Thomas Michel at Harvard Medical School (2017). During his studies, Dr. Eroğlu earned a number of national and international awards, grands, and patents. Few years ago he co-established a spin-off company in Austria. Since August 2019, he continues his studies in the design and development of novel genetically encoded biosensors with his lab members to unveil the secrets of life on the single cell level.

Melih Türkseven
MECHATRONICS ENGINEERING

Melih Türkseven is a faculty member in the Mechatronics Engineering Program. He received his B.S. degree in Mechanical Engineering at Boğaziçi University in 2010, and his Ph.D. degree in Mechanical Engineering at the Georgia Institute of Technology in 2016. His Ph.D. thesis has focused on design and control of fluid-driven robots. Following his graduate study, he joined the Center for Modeling, Simulation, and Imaging (CeMSIM) at Rensselaer Polytechnic Institute as a post-doctoral research associate, where he developed haptic interfaces for surgical virtual reality simulators as part of a large interdisciplinary group.

His background is mainly on control theory, tele-operated systems and their applications on human-machine interfaces. His current research interest is the design and control of soft, compliant robotic systems. He endeavors to develop the next-generation flexible, light-weight robots that interact with humans.

Ezgi Karabulut Türkseven
INDUSTRIAL ENGINEERING

Ezgi Karabulut Türkseven is a faculty member in the Industrial Engineering Program. She received her B.Sc. and M.Sc. degrees in Industrial Engineering from Boğaziçi University in 2010 and 2012 respectively. She then attended Georgia Institute of Technology and received her Ph.D. degree in Operations Research in 2017. Before joining Sabanci University, she worked as a lecturer in Management School at Rensselaer Polytechnic Institute for two years.

Her research mainly focuses on discrete optimization, with applications of multi-agent systems varying from bilevel optimization to distributed optimization. Without restricting herself to a particular application area, she's

intrigued by the idea of algorithm design for discrete optimization problems in general. Recently she's been working on machine learning in online optimization problems.

Ozan Biçen
ELECTRONICS ENGINEERING

Ozan Bicen is a faculty member in the Electronics Engineering Program. He received his B.Sc. degree in Electrical and Electronics Engineering from Middle East Technical University, Ankara, Turkey, in 2010. He received his M.Sc. in Electrical and Electronics Engineering from Koc University, Istanbul, Turkey in 2012. He obtained his Ph.D. in Electrical and Computer Engineering at the Georgia Institute of Technology, Atlanta, Georgia in 2016. He was a postdoctoral researcher in the School of Electrical and Computer Engineering at the Georgia Institute of Technology prior to joining Sabanci University, Istanbul, Turkey in 2019. His research has been at the intersection of signal processing, mathematical modeling, and statistical analysis in relation to physical, biological, and engineered systems.

Durmuş Ali Demir
PHYSICS

Durmuş Ali Demir is a faculty member in Physics Program. He earned his B. Sc. degree in 1991 in Electrical and Electronics Engineering at METU, with a minor B. Sc. degree in Physics. After obtaining his Ph.D. degree in 1995 in Physics at METU, he has carried out post-doctoral studies at the University of Pennsylvania (Philadelphia, USA) from 1996 to 1997, at the Abdus Salam International Centre for Theoretical Physics (Italy) from 1998-2000, and at the William Fine Theoretical Physics Institute (Minneapolis, USA) from 2000 to 2003. He was a visiting scientist at DESY, Hamburg, Germany from 2008 to 2009. His research involves model-building and phenomenology (quantum tunneling, fundamental particles, and astroparticle phenomena).

Durmuş Ali Demir was a faculty member at İzmir Institute of Technology from 2003 to 2019, where he has served as Dean of the Faculty of Science, Chair of the Physics Department, and Director of the Graduate School.

Durmuş Ali Demir is a member of the World Academy of Sciences (TWAS) and the Science Academy-İstanbul. He holds Friedrich Wilhelm Bessel Research Award of the Alexander von Humboldt Foundation. He also holds incentive awards from TÜBİTAK, Sedat Simavi Foundation, TÜBA and the Parlar Foundation. He is in the editorial board of the LHEP journal.
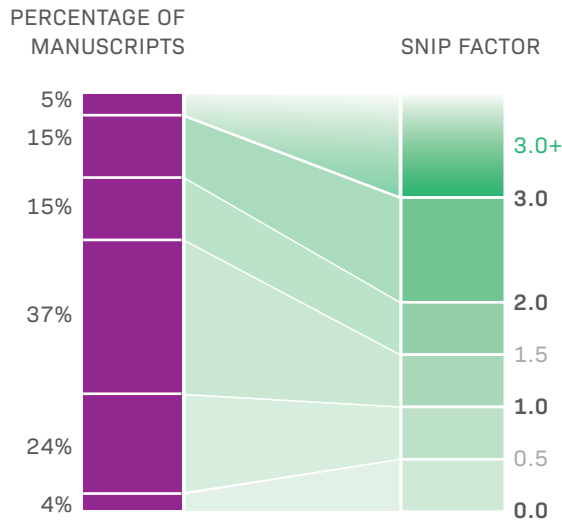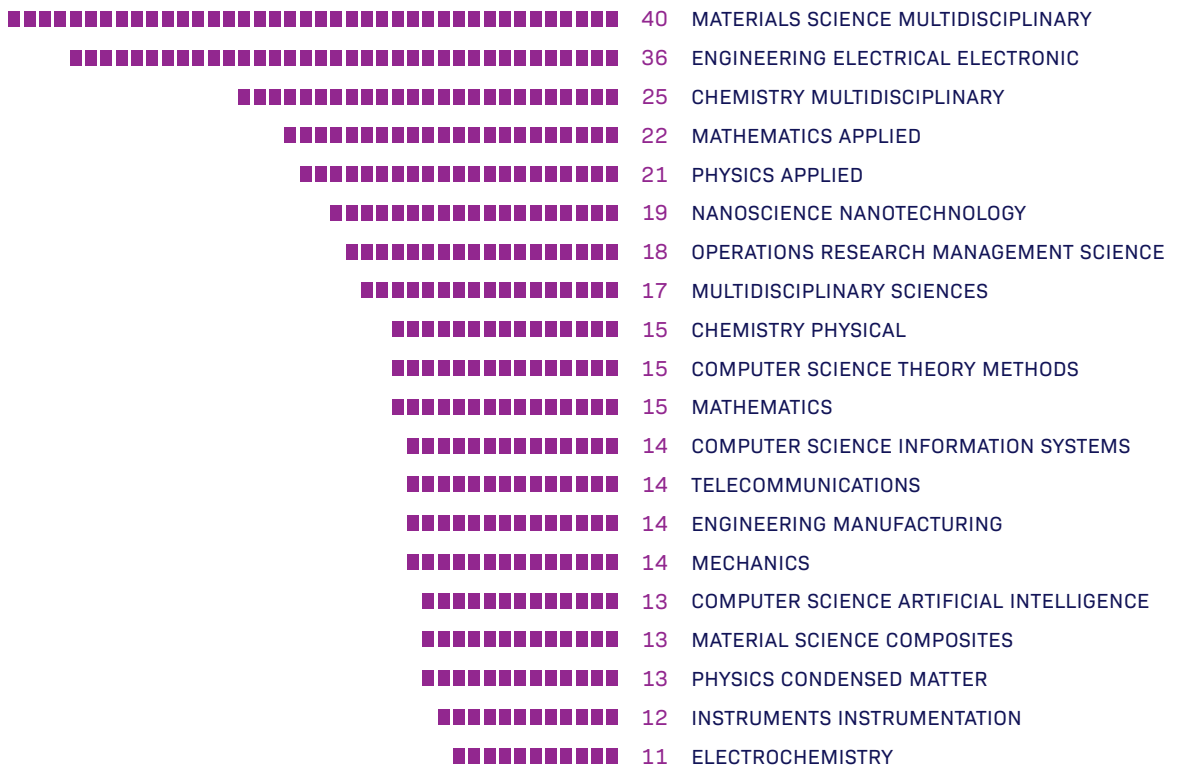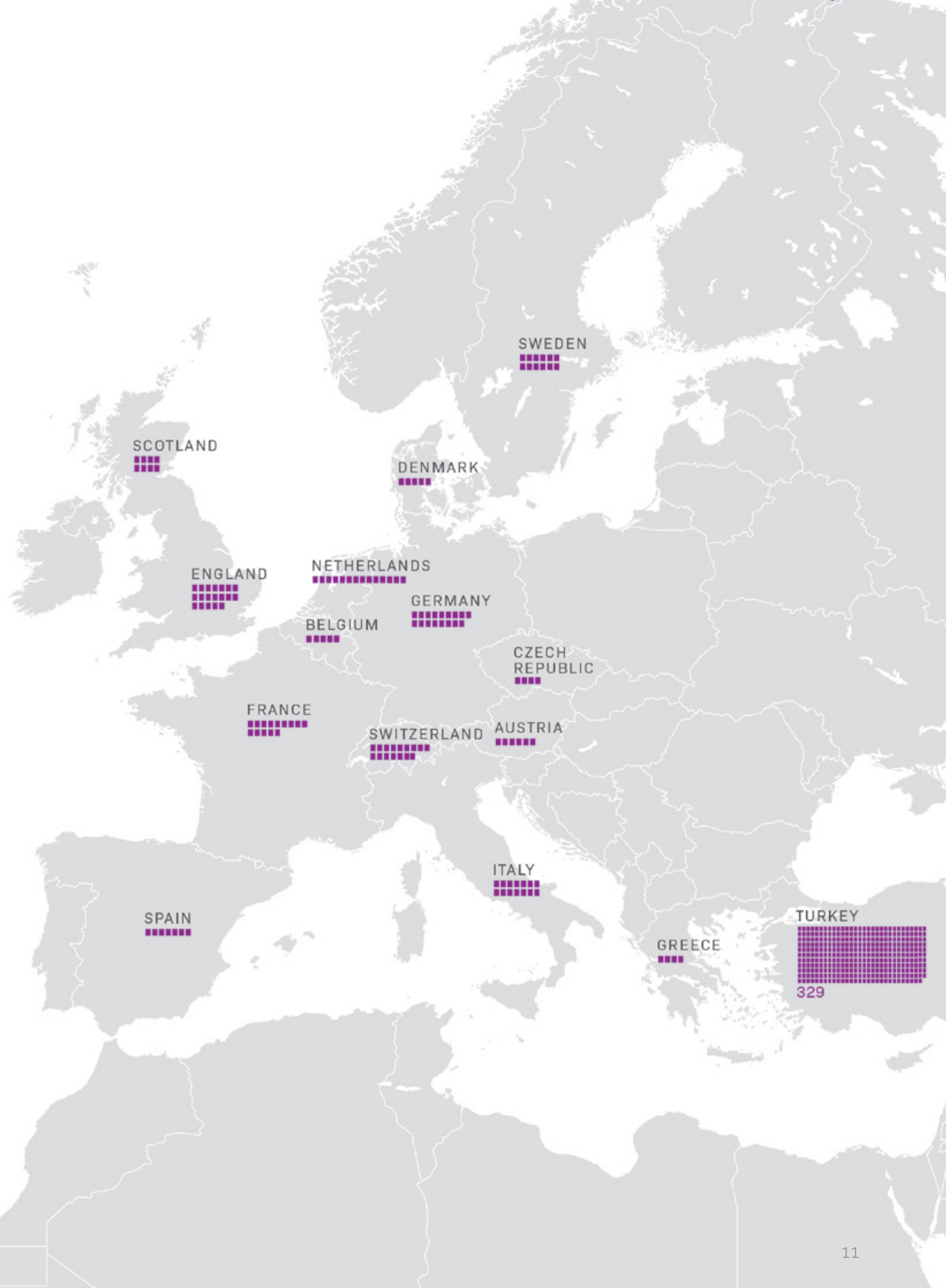
Publications

SNIP Factor Distribution

PERCENTAGE OF MANUSCRIPTS		SNIP FACTOR
5%		3.0+
15%		3.0
15%		2.0
37%		1.5
		1.0
24%		0.5
4%		0.0

Web of Science Categories

Count	Category
40	MATERIALS SCIENCE MULTIDISCIPLINARY
36	ENGINEERING ELECTRICAL ELECTRONIC
25	CHEMISTRY MULTIDISCIPLINARY
22	MATHEMATICS APPLIED
21	PHYSICS APPLIED
19	NANOSCIENCE NANOTECHNOLOGY
18	OPERATIONS RESEARCH MANAGEMENT SCIENCE
17	MULTIDISCIPLINARY SCIENCES
15	CHEMISTRY PHYSICAL
15	COMPUTER SCIENCE THEORY METHODS
15	MATHEMATICS
14	COMPUTER SCIENCE INFORMATION SYSTEMS
14	TELECOMMUNICATIONS
14	ENGINEERING MANUFACTURING
14	MECHANICS
13	COMPUTER SCIENCE ARTIFICIAL INTELLIGENCE
13	MATERIAL SCIENCE COMPOSITES
13	PHYSICS CONDENSED MATTER
12	INSTRUMENTS INSTRUMENTATION
11	ELECTROCHEMISTRY

SWEDEN

SCOTLAND

DENMARK

ENGLAND   NETHERLANDS

GERMANY

BELGIUM

CZECH
REPUBLIC

FRANCE

SWITZERLAND   AUSTRIA

ITALY

SPAIN

GREECE   TURKEY

329

Publications

299 Papers Published in 2019
with Collaborations from All
Around the World

SCOTLAND
8

ENGLAND
19

EUROPE
118

CANADA

U.S.A.
71

BRAZIL

RUSSIA

TURKEY

329

ISRAEL

IRAN

PAKISTAN

INDIA

CHINA

JAPAN

AUSTRALIA
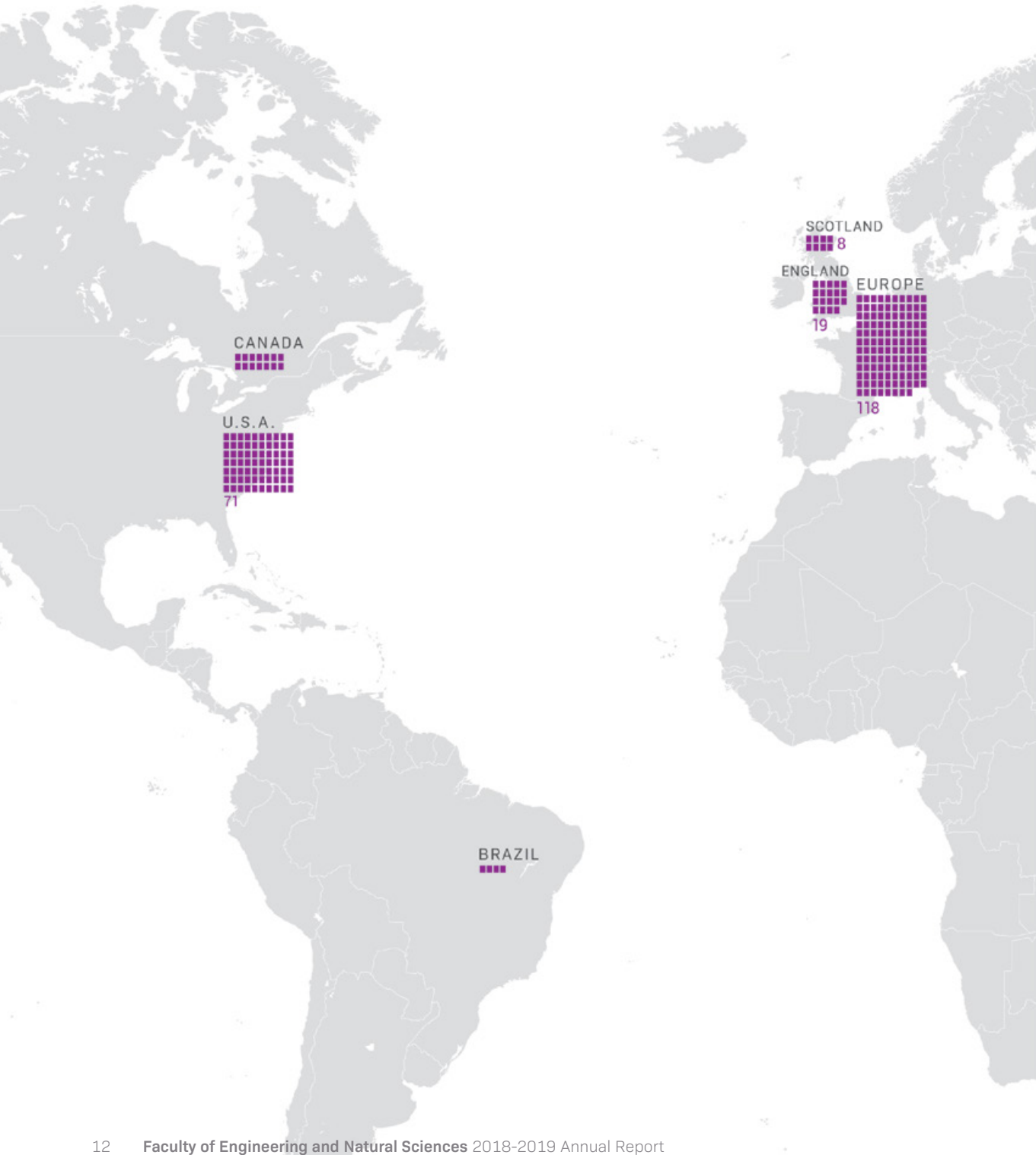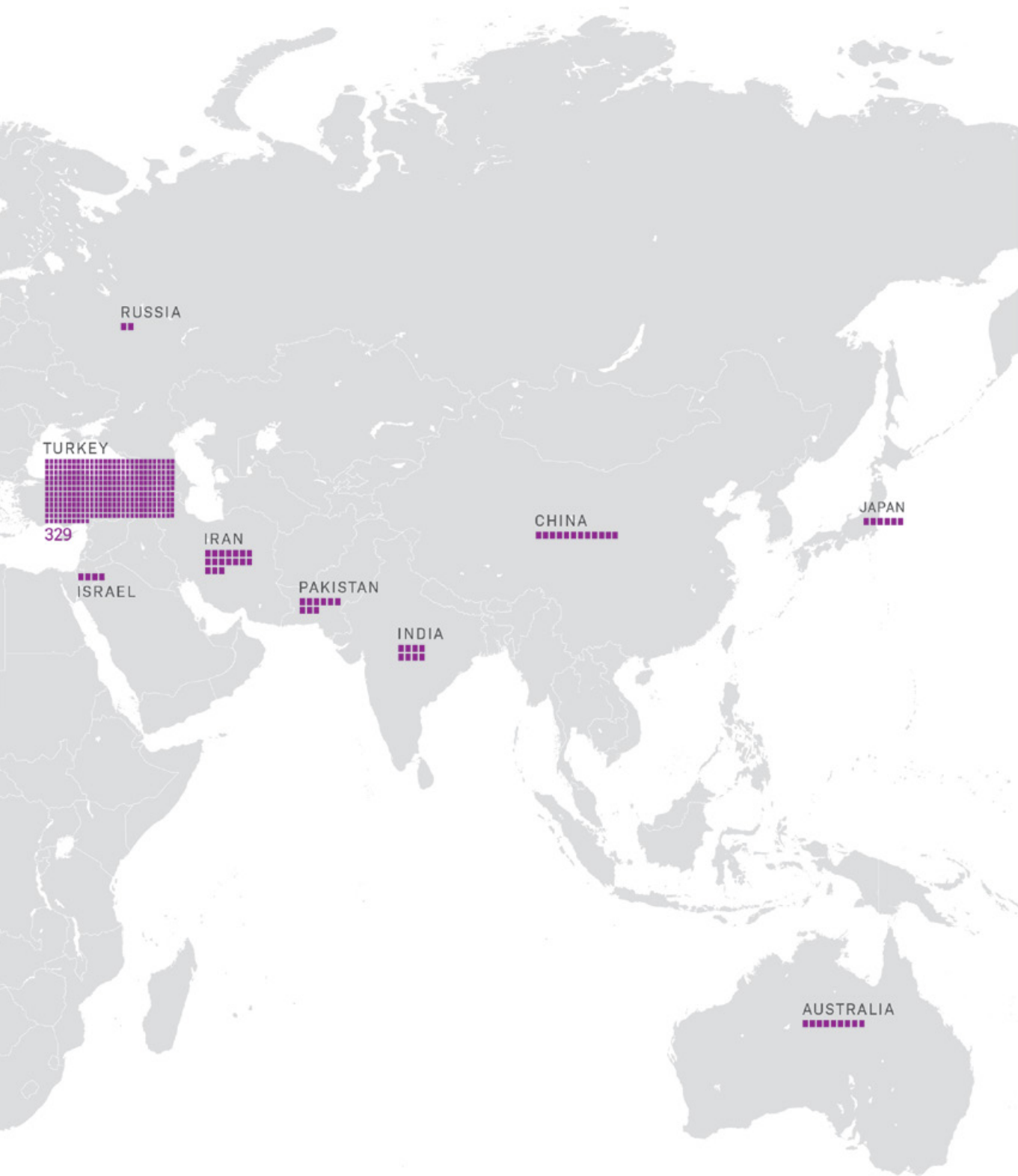
Patents

	INVENTORS
An Energy Harvesting Device	Ali Koşar
Pharmaceutical Drug Delivery System	Ali Koşar
Flow System For Avoiding Particle Agglomeration	Ali Koşar, Kürşat Şendur
Method For Three Dimensional Printing Of Heterogeneous Structures	Bahattin Koç
Use Of Mirnas For The Diagnosis, Prophylaxis, Treatment And Follow-Up Of Diseases involving Macroautophagy Abnormalities	Devrim Gözüaçık
Coherence Capacitor For Quantum Information Engine	İnanç Adagideli
Stable Electrospinning Composition For Stable Nano/ Submicrostructure Production And Preparation Method Thereof	Melih Papila, Yusuf Menceloğlu
Method For Production Of High Purity, High Crystallinity BN Structures At Moderate Temperatures	Melih Papila, Yuda Yürüm
Synchronized-Contention Window Full-Duplex Mac Protocol For Enabling Full-Duplex Communication in Wireless Local Area Network	Özgür Gürbüz

Projects

Budget Source as of June 2019

- ■ EU
- ■ Non-Governmental Organizations/University/Other
- ■ TUBITAK
- ■ Business Enterprises

FACULTY OF ENGINEERING AND
NATURAL SCIENCES
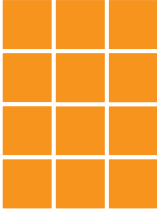
5 Projects
4.9 M

12 Projects
1.73 M

59 Projects
38.28 M
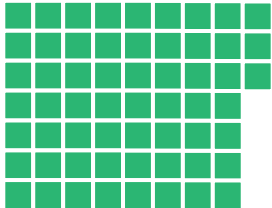
The budget of Center
of Excellence in Data
Analytics (CEDA) is
included.

72 Projects
50.29 M
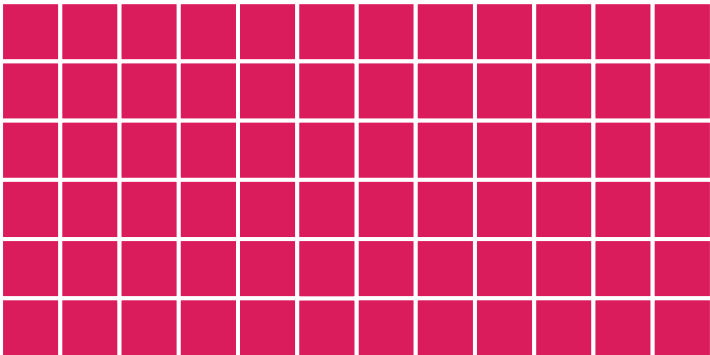
Industry-Focused Projects

WHAT IS THE INDUSTRY-FOCUSED PROJECT PROGRAM ?

" The Industry - Focused Project" is a program that enables companies to attack R&D challenges together with Sabancı University Engineering and Natural Sciences undergraduates. The program is carried out by senior undergraduate students of Sabancı University as part of their compulsory "Graduation Project" with the participating company representative and Sabancı University faculty member acting as advisors. The owner of the project is the commissioning company. Sabancı University and the companies are co-implementers of the project.

- This program enables industrial companies to engage in research projects that require considerable time, human resources and technical ability by cooperating with Sabancı University.

- This program provide new project ventures and collaboration opportunity both for faculty members and for companies/institutions.

- Senior students involved in the project comprise a useful talent pool for prospective employers who find an opportunity to know and train their potential colleagues.

This program offers an opportunity to advertise and promote both parties, Sabancı University and participating companies , because project's outputs are shared with other potential project stakeholders via Spring Event at the end of every academic year. In three years, apart from project stakeholders above 80 company/institutions were participated to the Spring Event. This invitation are shared with the press and internet portals.

OVERALL FACTS &FIGURES

The Industry Focused Program started in 2016- 2017 academic year fall semester. During three years since beginning, 34 companies/ institutions participated to the program as project stakeholders. Totally 64 projects were completed successfully. 225 senior students from various undergraduate programmes were assigned as a member of project working teams.
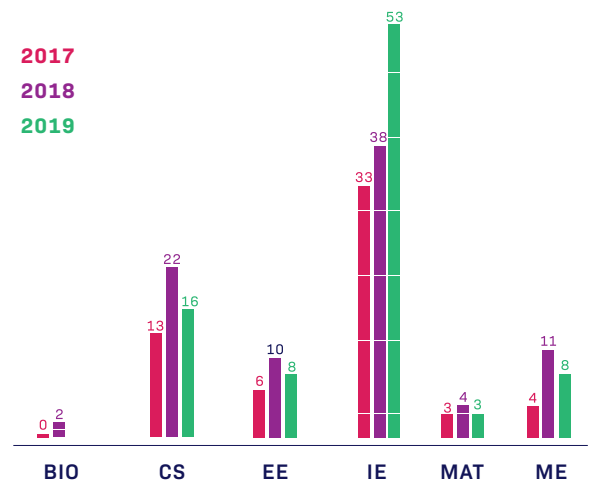
	COMPANIES	PROJECTS	STUDENTS
2017	10	17	59
2018	13	24	78
2019	18	23	88
TOTAL	41*	64	225

* 7 companies participated to the program more than once

PROGRAM DISTRIBUTIONS OF STUDENTS ATTENDED TO THE IFP

	2017	2018	2019
MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING	0	2	-
COMPUTER SCIENCE AND ENGINEERING	13	22	16
ELECTRONICS ENGINEERING	6	10	8
INDUSTRIAL ENGINEERING	33	38	53
MATERIALS SCIENCE AND NANO ENGINEERING	3	4	3
MECHATRONICS ENGINEERING	4	11	8
TOTAL	59	87	88

STUDENT MAJOR PROGRAM DISTRIBUTION

2017
2018
2019

	BIO	CS	EE	IE	MAT	ME
2017	0	13	6	33	3	4
2018	2	22	10	38	4	11
2019	-	16	8	53	3	8

Our
Stories

Technological Readiness Level

Basic Concept — 1
Conceptual Design — 2
Preliminary Design — 3
Detailed Design — 4
Bench/Lab Testing — 5
Prototype — 6
Field Test — 7
Pre-production — 8
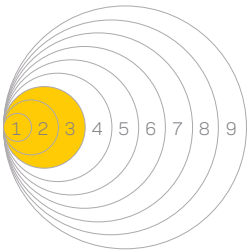Commercialized — 9
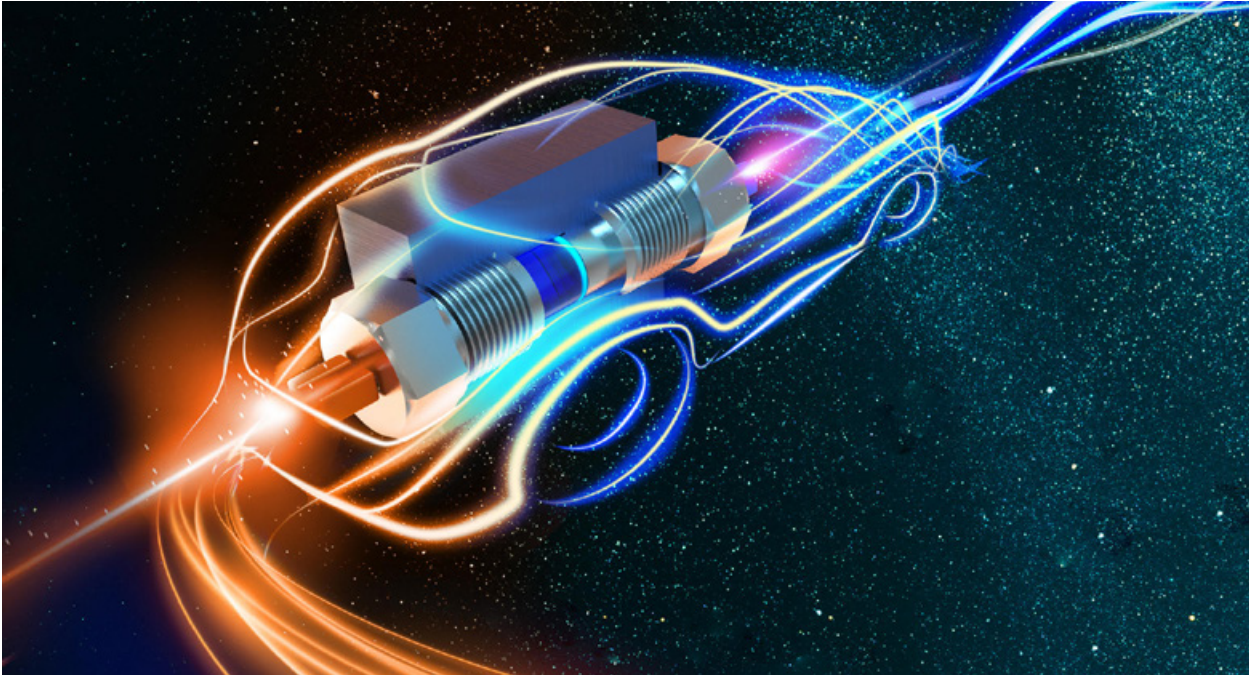
# Supercapacitor Devices "SUPERBATS"

Dr. Emre Erdem(SÜ)

Emre Erdem has been awarded a grant for his project entitled "Defect induced electrode materials for the design of battery like supercapacitor devices-SUPERBATS" within the TÜBITAK 2232 International Fellowship for Outstanding Researchers Program. This program supports the high level scientific and/or technological research projects. With this grant, Emre Erdem as the principal investigator, will establish a laboratory having state of the art ESR spectroscopy, photoluminescence spectroscopy, ball milling device, hydrothermal reactor, as well as electrochemical test instruments. This will enable extensive control of material properties such as defect structures and performance testing of **SUPERBATS.**
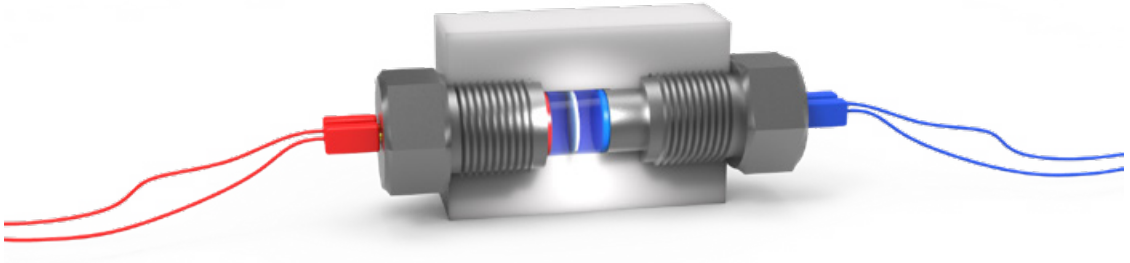
Defect structures in solid materials such as single crystals, thin films, powders, and ceramics have a significant impact on the physical and chemical properties of the materials. The effect is more pronounced when materials systems are architectured in nanoscale. Resonance spectroscopy, particularly electron spin resonance (ESR) spectroscopy, is one of the most powerful tools and methods of choice due to its superior sensitivity for identifying the paramagnetically active structural point defects, as well as distinguishing and characterizing stable or meta-stable energy states. It also reveals insights about their microscopic origins, hence their active role in material properties.

Solid-state materials, in particular metal oxides, have plenty of intrinsic point defects that are ionized, thus paramagnetic. Because of their high specific capacitance and low resistance, nano-sized highly defective metal oxides such as ZnO, In_2O_3, Co_3O_4, $FeCo_2O_4$, MnO_2, RuO_2 have great potential as electrode materials in the design of supercapacitors with high energy and high power density. For instance, ZnO based composite electrode materials have promising properties such as good electrochemical reversibility, high specific capacitance, high power density, high energy density, and good cycle number stability, making them promising materials for next-generation supercapacitors

seperator
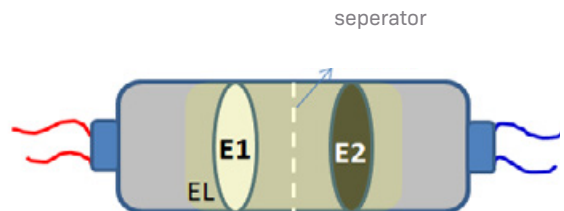
Supercapacitor Design
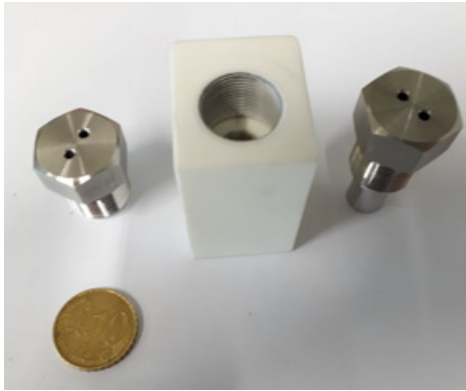
Identification of the defect type is a major challenge when utilizing metal oxides in the design of supercapacitors. Emre Erdem's research focuses on using ESR spectroscopy to detect, assign and count the defects, exploiting the paramagnetic nature of metal oxides. ESR spectroscopy enables us to extensively control the structural point defects which are crucial since the defects have a direct influence on especially the chemical and physical properties such as optical, electrical, magnetic and electronic.

Recent studies of Emre Erdem in the field of supercapacitors have shown the still open issues that encourage the design of better devices and the future steps for the improvement of supercapacitors.
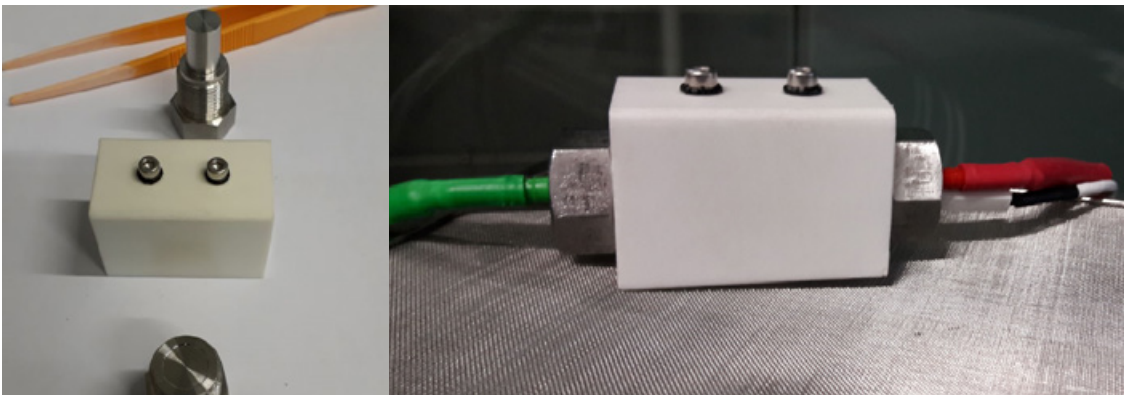

Photographs of the home-made prototype capacitor mounting system to be used in the production of supercapacitors which was designed by the candidate E. Erdem and produced by the fine mechanic workshop via CNC machine. Illustration of supercapacitors mounting device showing the inside components after mounting the supercapacitor elements. Note that in reality, the electrodes are touching the surface of the separator.
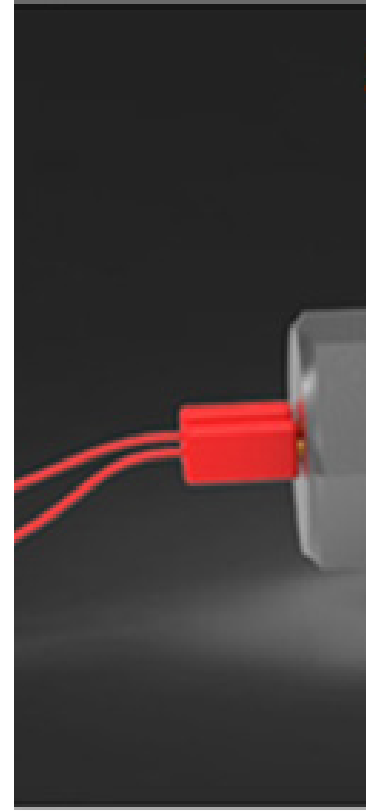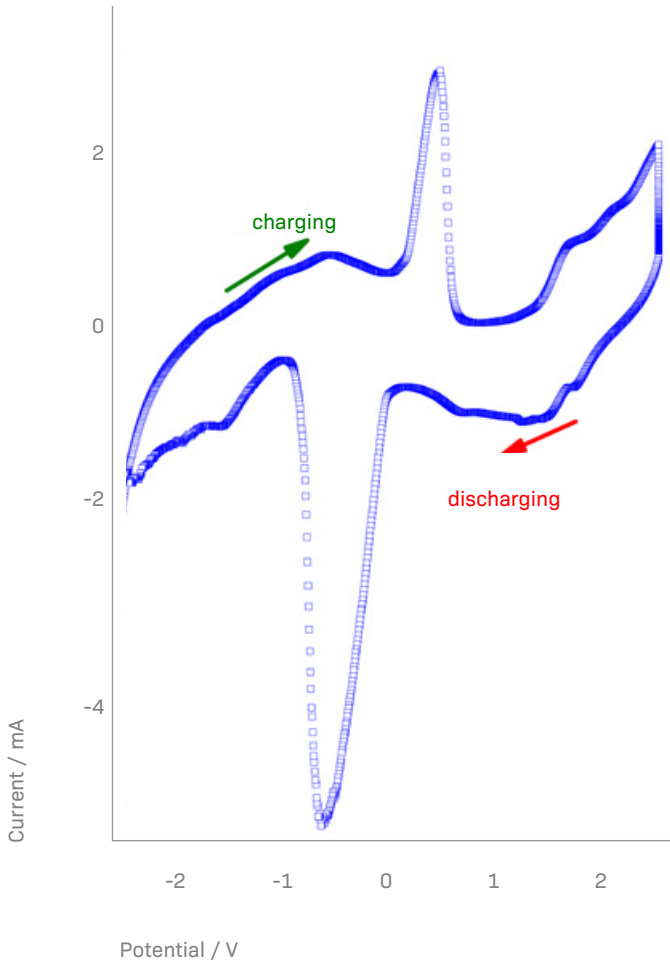
We study smart and functional materials utilizing sophisticated and advanced characterization tools in order to make the best choices for effective high energy storage devices of the future. This is what we do in FENS lab!

— Prof. Erdem.
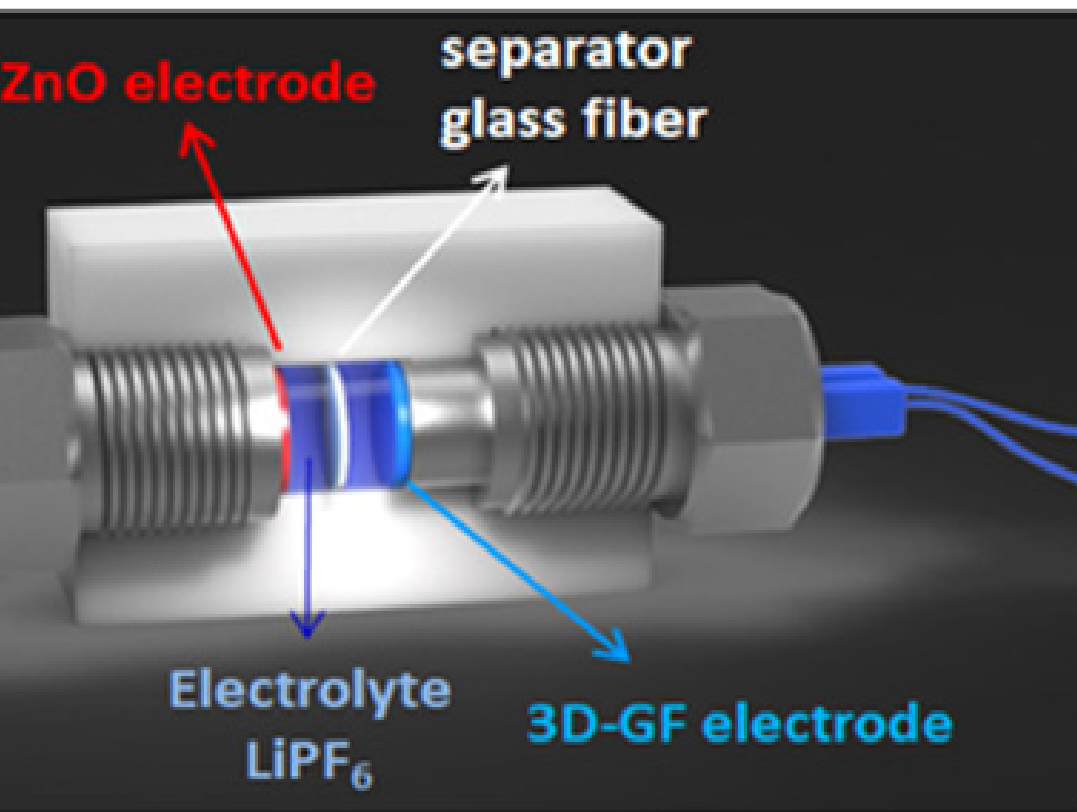
Cyclic voltammetry (CV): Electrochemical performance result of the superbat designed with ZnO nanocrystal and graphene foam electrodes, LiPF6 electrolyte and glass fiber separator.

In any energy storage device such as a battery or a capacitor, the role of defect structures in the electrode materials needs to be thoroughly investigated. Recently, the importance of vacancies in functional materials for clean energy storage and harvesting was reported as "the perfect imperfection" pointing out that the materials' physical and chemical properties (i.e. bandgap and electrical conductivity as the electrochemical performance of electrode materials) could be manipulated by the extensive control of the defect centers. The selection of electrode materials is not the only main criteria affecting performance; electrolyte and separator are also key components to achieve outstanding lifecycle and high specific capacitance values.
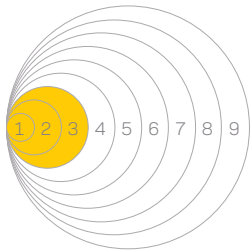
To improve the performance of energy devices through materials science, metal ion doping, controlling surface defects, the behaviour of defects at nanoscale and well-defined electrode materials are areas open for investigation.
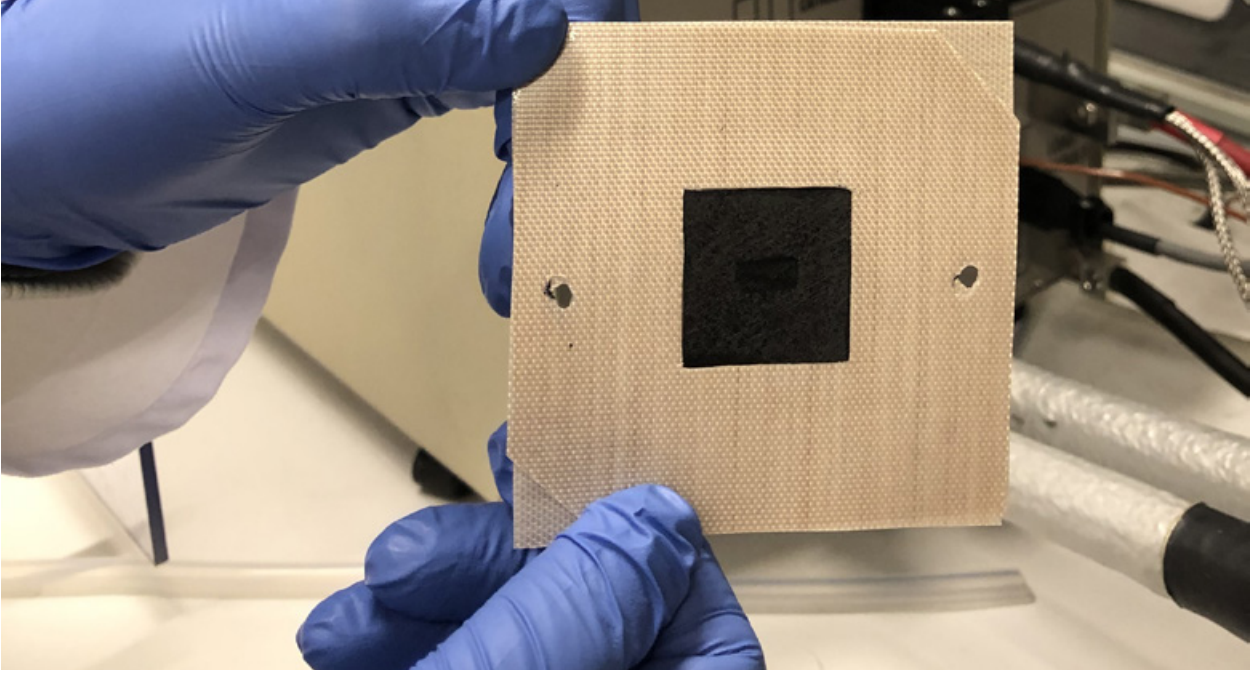
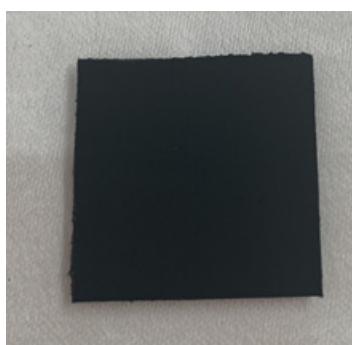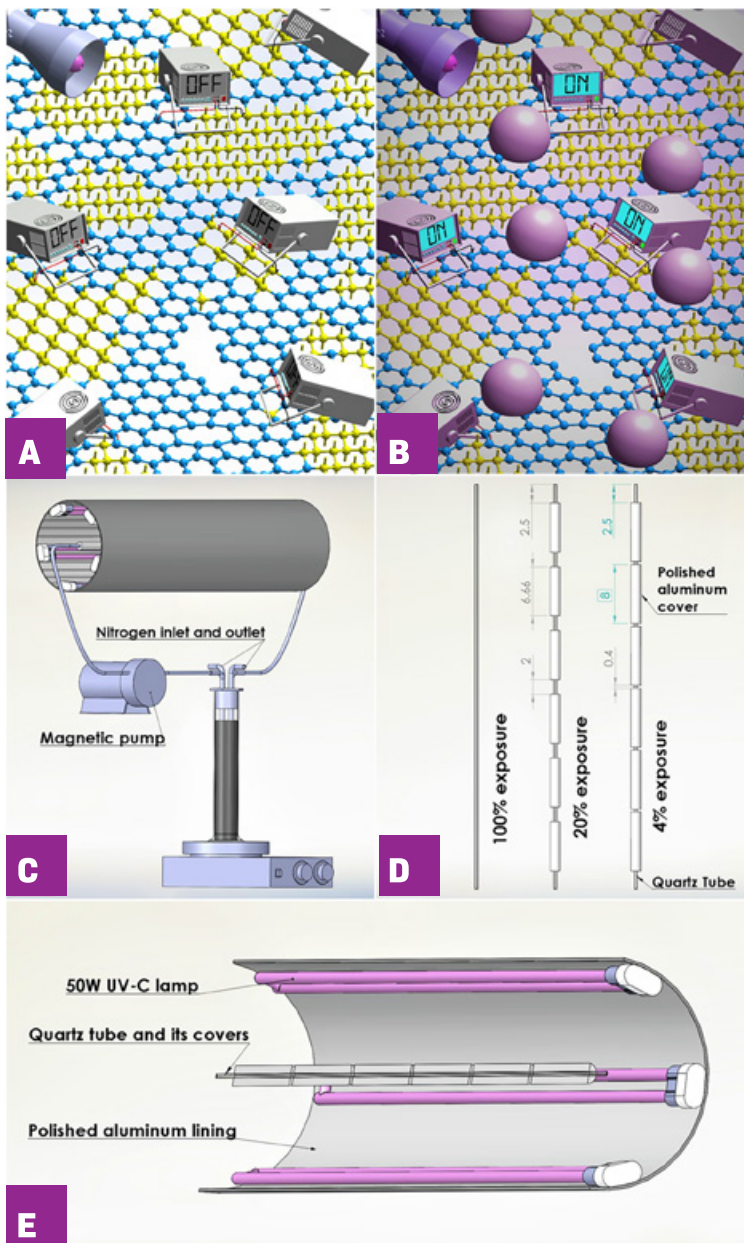# New Generation Graphene-based Catalysts and Electrodes for PEM Fuel Cells

Prof. Selmiye Alkan Gürsel (SÜ)
Dr. Begüm Yarar (SUNUM)

Sabancı University Energy Storage and Conversion Group has demonstrated new generation graphene-based catalysts and electrodes with enhanced fuel cell performance as a substitute of carbon black based materials.

Carbon black has been widely employed as the catalyst support for catalyst nanoparticles because of its high electrical conductivity and low cost; however, it has low corrosion resistance and durability in fuel cell conditions. One of the extraordinary forms of carbon materials that has attracted the attention of researchers in the last decades is graphene. Graphene, a single layer of sp2 hybridized carbon atoms in which the atoms are organized into a honeycomb like lattice, has extremely high electrical conductivity as well as excellent mechanical and corrosion-resistant properties. These characteristics have made graphene a promising candidate for catalyst support. It provides better dispersion of catalyst nanoparticles on the surface but restacking of individual graphene sheets causes a decrease in active sites and low utilization of catalyst nanoparticles.

The main components of the designed reactor with quartz tubes with different exposure lengths to control the duration of UV illumination and schematic illustration of graphene in dark situation Pt decorated graphene under UV illumination where growth of Pt nanoparticles has started (blue and yellow colored atoms have sp2 and sp3 hybridizations, respectively)

Nitrogen inlet and outlet

Magnetic pump

2.5
2.5
6.66
8
Polished aluminum cover
2
0.4
100% exposure
20% exposure
4% exposure
Quartz Tube

50W UV-C lamp

Quartz tube and its covers

Polished aluminum lining

Graphene-based Electrode

Fuel cells are one of the most promising electrochemical power sources both for transportation and portable applications. Among others, the polymer electrolyte membrane (PEM) fuel cells have received great attention due to their high-power density, quick start-up time, pollution free operation and compact structure. Despite the immense progress in fuel cell technology, there are still barriers to commercialization in terms performance, durability and cost. Moreover, the development of cost-effective materials to replace the state-of-the-art components is an important challenge.
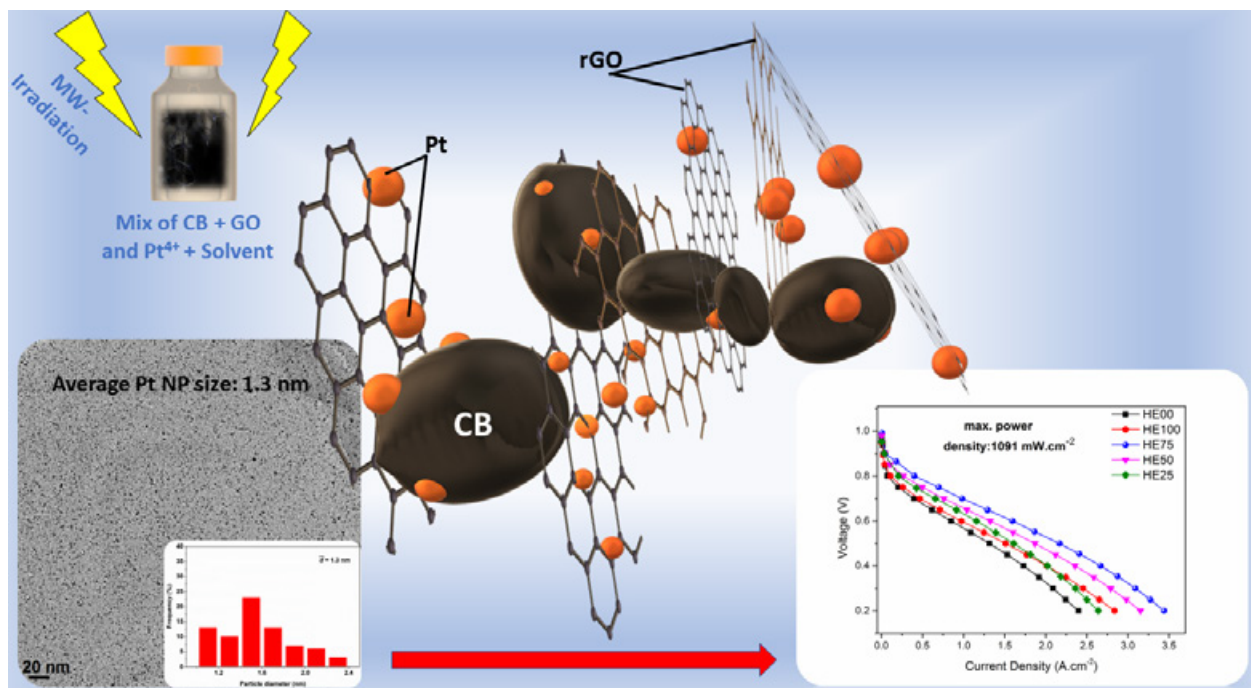
By a simple flow control in this reactor, it enables us to have precise control on the number of photoexcited electrons and consequently on the photocatalytic deposition of well dispersed the sub-nanosized Pt particles

— Prof. Gürsel.

Published papers:

Sina Abdolhosseinzadeh, Sina Sadighikia, Selmiye Alkan Gürsel. Scalable synthesis of sub-nanosized platinum-reduced graphene oxide composite by an ultra-precise photocatalytic method. ACS Sustainable Chemistry & Engineering (2018) 6: 3773.

Begüm Yarar Kaplan, Navid Haghmoradi, Emre Biçer, Cesar Merino, Selmiye Alkan Gürsel. High performance electrocatalysts supported on graphene based hybrids for polymer electrolyte membrane fuel cells. International Journal of Hydrogen Energy (2018) 43: 23221.

Sajjad Ghobadi, Rokhsareh Bakhtiari, Lale Işıkel Şanlı, Selmiye Alkan Gürsel. Green composite papers via use of natural binders and graphene for PEM fuel cell electrodes. ACS Sustainable Chemistry & Engineering (2017) 5 (9): 8407.

Erdinç Öztürk Solved MIT's 20-Year-Old Cryptographic Puzzle

MIT's Laboratory for Computer Science (LCS), now part of Computer Science and Artificial Intelligence Laboratory (CSAIL), celebrated its 35th birthday in 1999. During these celebrations, a time capsule of innovations was sealed, including a pile of breakthrough achievements of past LCS members. This time capsule was supposed to be unsealed during the 70th birthday of LCS, in 2034. Ron Rivest, a member of LCS and one of the inventors of RSA, prepared a cryptographic puzzle (LCS35) that would take 35 years to solve, taking Moore's Law into account. Solving this puzzle before the 35 year mark would result in unsealing the time capsule. Erdinç Öztürk, a faculty member of FENS started working on a project to achieve a significantly fast circuit for Verifiable Delay Functions (VDFs). VDFs that Erdinç was working on are based on a similar mathematical structure as the

cryptographic puzzle that was designed by Ron Rivest. Designing a novel algorithm for VDFs, Erdinç was able to implement a prototype circuit that solved the LCS35 puzzle in 60 days. Upon solution of the LCS35 puzzle,"LCS Time Capsule of Innovations" was unsealed in May 2019, 15 years earlier than predicted.

Awards & News

THE "METU PROFESSOR MUSTAFA PARLAR FOUNDATION 2018 AWARDS"

"Members of the FENS won METU Professor Mustafa Parlar Research and Education Foundation 2018 Awards.
As part of the METU Professor Mustafa Parlar Foundation 2017 Awards, Sabancı University Faculty of Engineering and Natural Sciences members Mehmet Ali Alpar, Erhan Budak and Semih Onur Sezer won the Honor Award, the Science Award, and the Research Incentive Prize, respectively."

EMRE ERDEM APPOINTED NEW EDITOR-IN-CHIEF FOR EXPERIMENTAL RESULTS

Materials Science and Nano Engineering Program Faculty Member Emre Erdem has been appointed as Editor-in-Chief position in newly established journal: Experimental Results.

DR. ÖZLEM KARAHAN- 2019-2020 FULBRIGHT RESEARCH AWARD

Dr. Özlem Karahan has been selected as one of the recipients of the prestigious and highly competitive 2019-2020 Fulbright Research Award.

FENS FACULTY MEMBERS RECEIVED 2019 THE SCIENCE ACADEMY BAGEP AWARDS

Awards will be presented to FENS Faculty members Eralp Demir in Mechatronics Engineering Program, Ogün Adebali in Molecular Biology, Genetics and Bioengineering, Özge Akbulut in Materials Science and Nanoengineering Program, Turgay Bayraktar in Mathematics Program.
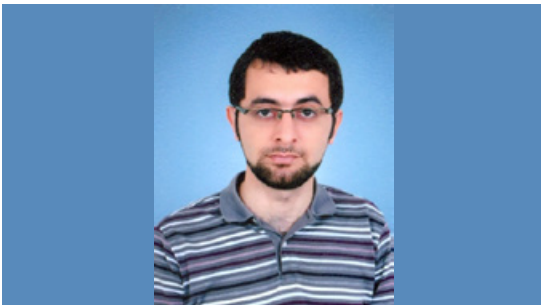
ERCAN KALALI WON THE IEEE TURKEY PHD THESİS AWARD

Sabanci University 2013 master's and 2018 PhD in Electronics Engineering graduate Ercan Kalalı won the IEEE Turkey PhD Thesis Award.

Awards & News

ZEHRA SAYERS RECEIVED 2019 AAAS AWARD FOR SCIENCE DIPLOMACY

EFNS Faculty Member Zehra Sayers became the first Turkish national to win the AAAS Award for Science Diplomacy given since 1992.
 sensor will be able to detect GMO in baby food, animal feed and other allergenic food products in 30–40 minutes. Researchers aim to turn the sensor into a final product in 2 years.

SUCCESS OF ME STUDENTS

ME graduate student Umut Çalışkan, and ME alumni Ardan Apaydın and Ata Otaran have won the third place in the Automotive Haptics Challenge at AsiaHaptics 2018.

ALBERT LEVI RECEIVED "COMPUTER ENGINEERING SCIENCE AWARD"

"Computer Engineering Science Award" is given by the TBD (Informatics Association of Turkey) with the scope of ""Prof. Dr. Aydın Köksal Awards"

ÖZGÜR GÜRBÜZ AND İBRAHIM TEKİN WON TECHNOLOGY AWARD

FENS Faculty Members Özgür Gürbüz and İbrahim Tekin won the 2018 Elginkan Foundation Technology Award.

FACULTY MEMBERS NAMED WORLD'S TOP NANO-SCIENTISTS

The Webometrics list of the best nanotechology-nanoscience experts of the world included Faculty of Engineering and Natural Sciences members Yuda Yürüm and Yusuf Menceloğlu.

ARZU ÖZBEY RECEIVED MARIE SKLODOWSKA-CURIE ACTIONS SEAL OF EXCELLENCE

Mechatronics Ph.D. Graduate Arzu Özbey received Marie Sklodowska-Curie Actions Seal of Excellence.

Double PhD Degree Program

Electronics Engineering Double PhD Diploma between National Chiao Tung University

A double PhD diploma program has been developed between the Electronics Engineering PhD Program in Sabancı University, and the Microelectronics and Electrical Engineering Programs in the field of Semiconductor Technology in National Chiao Tung University (NCTU), one of the top-ranked universities in Taiwan.
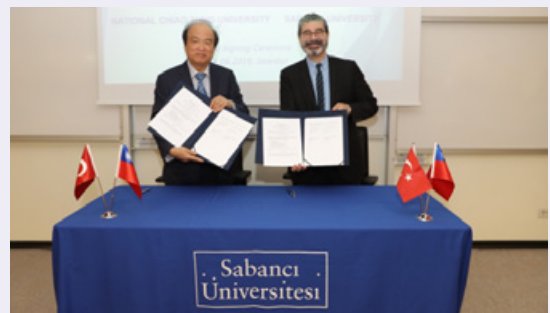
Alumni in Academy

Alparslan Emrah Bayrak (ME BS, 2011) is an Assistant Professor in Stevens Institute of Technology - USA.

Çağatay Türkay (CS MSc, 2009) is an Associate Professor in the University of Warwick.

Nurşen Aydın (IE PhD, 2014) is an Associate Professor at Warwick Business School.

Elif Damla Arısan (BIO PhD, 2009) is a Faculty Member in Gebze Technical University.

Sarmad Ahmed Shaikh (EE MSc, 2015) is a Faculty Member in Karachi Institute of Economics and Technology

Aslı Yenenler (BIO PhD, 2017) is a Faculty Member at Biruni University.

Zoya Khalid (BIO PhD, 2017) is a Faculty Member at National University of Computer and Emerging Sciences.

Sonya Javadi Khatab (IE PhD, 2018) is a Faculty Member at Doğuş University.

Hammad Zaki (ME PhD, 2019) is a Faculty Member at UET Taxila.

Mehmet Karaca (EE PhD, 2013) is an Assistant Professor at TED University.

Alumni in Academy

Akhtar Rasool (ME PhD, 2017) is an Assistant Professor in Sharif College of Engineering.

Berk Çallı (ME MSc, 2008) is a Faculty Member in Worcester Polytechnic Institute.

Barış Çakmak (PHYS PhD, 2014) is a Faculty Member at Bahçeşehir University.

Funda Özdemir (MATH PhD, 2016) is a Faculty Member at İstinye University.

Leyla Parlar Ateş (MATH PhD, 2017) is a Faculty Member in MEF University.

Babar Hussain (BIO PhD, 2018) is a Faculty Member at University of Central Punjab.

Faran Ahmed (IE PhD, 2019) is a Faculty Member at NUST Business School.

Serhan Coşar (EE PhD, 2013) is a Senior Lecturer in Robotics at De Montfort University.

toSUn Overview

toSUn HPC cluster was physically installed in October 2019.

Our new Linux-based High Performance Computing cluster was launched in October 2019. In memory of our Founding President Tosun Terzioglu, its name was chosen as ToSUn. By specifying the application to run, you can send access requests by selecting MDBF-Server/Web in the Call Center support form.

→ **You can see detailed information on the website: https://su-hpc-tutorials.readthedocs.io/**

- # of compute node: **7**
- # of core per compute node: **36**
- # of memory per compute node: **256**
- # of GPGPU: **2xNVIDIA Tesla V100 32 GB + 4 NVIDIA Tesla K80 24 GB**
- # of compute Node: **7 x Dell PowerEdge R740**
- # of Submitted calculation since October 2019: **2089**
- TOTAL CPU core: **340**
- TOTAL Computation Power: **4,867.20 GFLOPs**
- **288 TB** shared disk storage.

We made a public vote to find the name of the HPC Cluster system via Twitter.

14.10.2019

In memory of our Founding President Tosun Terzioglu, its name was chosen as ToSUn among the 82 offers.

FENS/MDBF @ sabanciuniv
@fenssabanci

Name Contest: Help name our brand new High-Performance Cluster at FENS

Contest End Date:
October 25, 2019

fens.sabanciuniv.edu/en/announcemen...

How to Submit: Tweet your suggested HPC name to @fenssabanci and tell us why you picked it. Don't forget to include the hashtag #FENS_HPC.

1:20 PM · Oct 14, 2019 · Twitter Web App

4 Retweets   10 Likes

FENS/MDBF @ sabanciuniv @fenssabanci · Oct 14, 2019
Replying to @fenssabanci
General idea:

We have a brand new High-Performance Cluster to be used for research purposes at the Faculty of Engineering and Natural Sciences. We are looking for a creative name that uniquely represents Sabancı University or describes a feature specific to SU

FENS/MDBF @ sabanciuniv @fenssabanci · Oct 14, 2019
Prize: A Starbucks gift card for 250 TL to enjoy a few drinks.

Our Awards

3MT THREE MINUTE THESIS AWARDS

The second Three Minute Thesis (3MT®) competition was hosted by Sabancı University on On May 8th, 2019. Founded by the University of Queensland Australia, the competition was carried out by the Sabancı University Faculty of Engineering and Natural Sciences Research Awards Committee.

11 successful FENS PhD candidates presented their research, each in three minutes. At this exciting and fun day, after thoughtful deliberation, our panel of guest judges declared the winner and the runner-up.

WINNER PRIZE

Navid Haghmoradi, 3 MT 2019 winner, Materials Science and Nanoengineering PhD,
"The Application of Graphene in Production of Electricity from PEM Fuel Cells"

RUNNER-UP PRIZE

Mastaneh Torkamani Azar, 3 MT 2019 Runner-Up, Electronics Engineering PhD, "Neuro-adaptive Brain-Computer Interfaces with Mental State Recognition using Sequential Inference Techniques"

PEOPLE'S CHOICE PRIZE

Abdolali Khalili Sadaghiani, 3MT 2019 People's Choice, Mechatronics Engineering PhD "Bioinspired surface modification techniques for energy enhancement"

→ **Please visit the 3MT Awards** website for more information about the competition.

GÜRSEL SÖNMEZ AWARDS

The "Gürsel Sönmez Awards" established in 2006 in memory of the Faculty of Engineering and Natural Sciences member and valued scientist Gürsel Sönmez were given for the 13th time this year.

To commemorate his achievements and to inspire and encourage young scientists, an award is presented each year to selected graduate students of FENS who write distinguished MS or PhD theses. The selection process is pursued at the end of each academic year, by the Gürsel Sönmez Award Committee formed by faculty members representing each program.

The following students are the recipients of the Gürsel Sönmez Research Award in 2018–2019.

Abdolali Khalili Sadaghiani, ME Program 2018–2019 Spring Semester candidate.

Ercan Kalalı, Honorable Mension.

Muhammed Ali Bingöl, Honorable Mension.

Shahbaz Abbasi, Honorable Mension.

→ **Please visit the "Gürsel Sönmez"** website for more information about the competition.

SAKIP SABANCI AWARD FOR THE HIGHEST RANKING UNDERGRADUATE STUDENT

Winner is Naci Ege Saraç who graduated from the Computer Science and Engineering Program.

Our Awards

FENS EXCELLENCE IN TEACHING AWARDS 2019

We are delighted to announce our outstanding graduate students FENS Teaching Award recipients. The recipients, their programs and the courses they supported are as follows:

Aysu Yurduşen
Materials Science and Nano Engineering
PhD Student
NS 102

Melike Nur Önder
Materials Science and Nano Engineering
PhD Student
NS 102

Merve Buldu
Materials Science and Nano Engineering
PhD Student
ENS 205

Osman Şahin
Electronics Engineering
MSc Student
EE 407 & MATH 201

Tuğdem Muslu
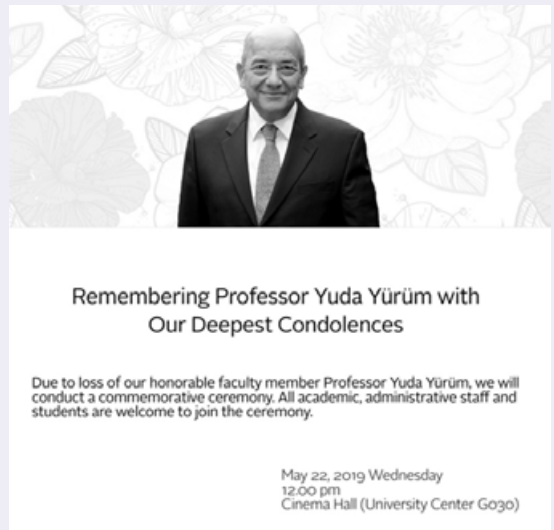Molecular Biology, Genetics and Bioengineering
NS 101

Commemorative Ceremony for
Professor Yuda Yürüm

We are deeply saddened by the loss of our Emeritus Professor Yuda Yürüm, who passed on April 26, 2019.

Professor Yürüm received his BS degree in Chemical Engineering from Middle East Technical University in 1969, and his PhD degree from Hacettepe University in 1974. He became a professor at the age of 39 and has been an active faculty member of Sabancı University since 1999. Throughout his career he received many awards and recognitions. He has been a fellow of The Royal Society of Chemistry, Great Britain since 2000.

Professor Yürüm had committed himself to teaching and research. He has been a role model to us all, not only academically, but also in kindness and grace.

Remembering Professor Yuda Yürüm with Our Deepest Condolences

Due to loss of our honorable faculty member Professor Yuda Yürüm, we will conduct a commemorative ceremony. All academic, administrative staff and students are welcome to join the ceremony.

May 22, 2019 Wednesday
12:00 pm
Cinema Hall (University Center G030)

FACULTY of ENGINEERING and NATURAL SCIENCES CONNECTIONS

→ **Learn about FENS:** fens.sabanciuniv.edu

Computer Science and Engineering cs.sabanciuniv.edu
Cyber Security sec.sabanciuniv.edu
Electronics Engineering ee.sabanciuniv.edu
Industrial Engineering ie.sabanciuniv.edu
Manufacturing Engineering mfg.sabanciuniv.edu
Materials Science and Nano Engineering mat.sabanciuniv.edu
Mechatronics me.sabanciuniv.edu
Molecular Biology, Genetics and Bioengineering bio.sabanciuniv.edu

Chemistry chem.sabanciuniv.edu
Energy energy-minor.sabanciuniv.edu
Mathematics math.sabanciuniv.edu
Physics phys.sabanciuniv.edu

Data Analytics da.sabanciuniv.edu
Energy Technologies and Management energy.sabanciuniv.edu
Information Technology msit.sabanciuniv.edu

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