CoE for Functional SUrfaces and interfaces for Nano diagnostics

A memory from the Winter Nanotechnology Boot Camp for High School Students Jointly Organized by SUNUM and EFSUN (organized since 2018)

Sabancı Üniversitesi

CoE for Functional SUrfaces and interfaces for Nano diagnostics
Executive Board

Prof. Ali Koşar (Director, ME*)

Asst. Prof. Murat Kaya Yapıcı (EE*)

Prof. Kürşat Şendur (ME)

Prof. Burç Mısırlıoğlu(Co-Director, MAT*)

Assoc. Prof. Gözde İnce (MAT)

Prof. Funda Yağcı Acar (Koç Univ.)

Assoc. Prof. Emre Erdem (MAT)

* MAT: Materials Science&Nanoengineering Program
* ME: Mechatronics Program
* EE: Electronics Engineering Program

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CoE for Functional SUrfaces and interfaces for Nano diagnostics Advisory Board

Sadık Esener

Director, Nano-Tumor Center,

University of California at San Diego

Mehmet Toner

Professor of Bioengineering,

Harvard Medical School

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Yusuf Leblebici

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Sabanci University

Yoav Peles

Mechanical Engineering Department Head,

University of Central Florida

Pamir Alpay

Materials Science Engineering Department Head,

University of Connecticut

Mehmet Yıldız Vice President for Research and Development, Sabanci University

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CoE for Functional SUrfaces and interfaces for Nano diagnostics

Number of Research Staff **36**

Number of SU /SUNUM Research Staff **14**

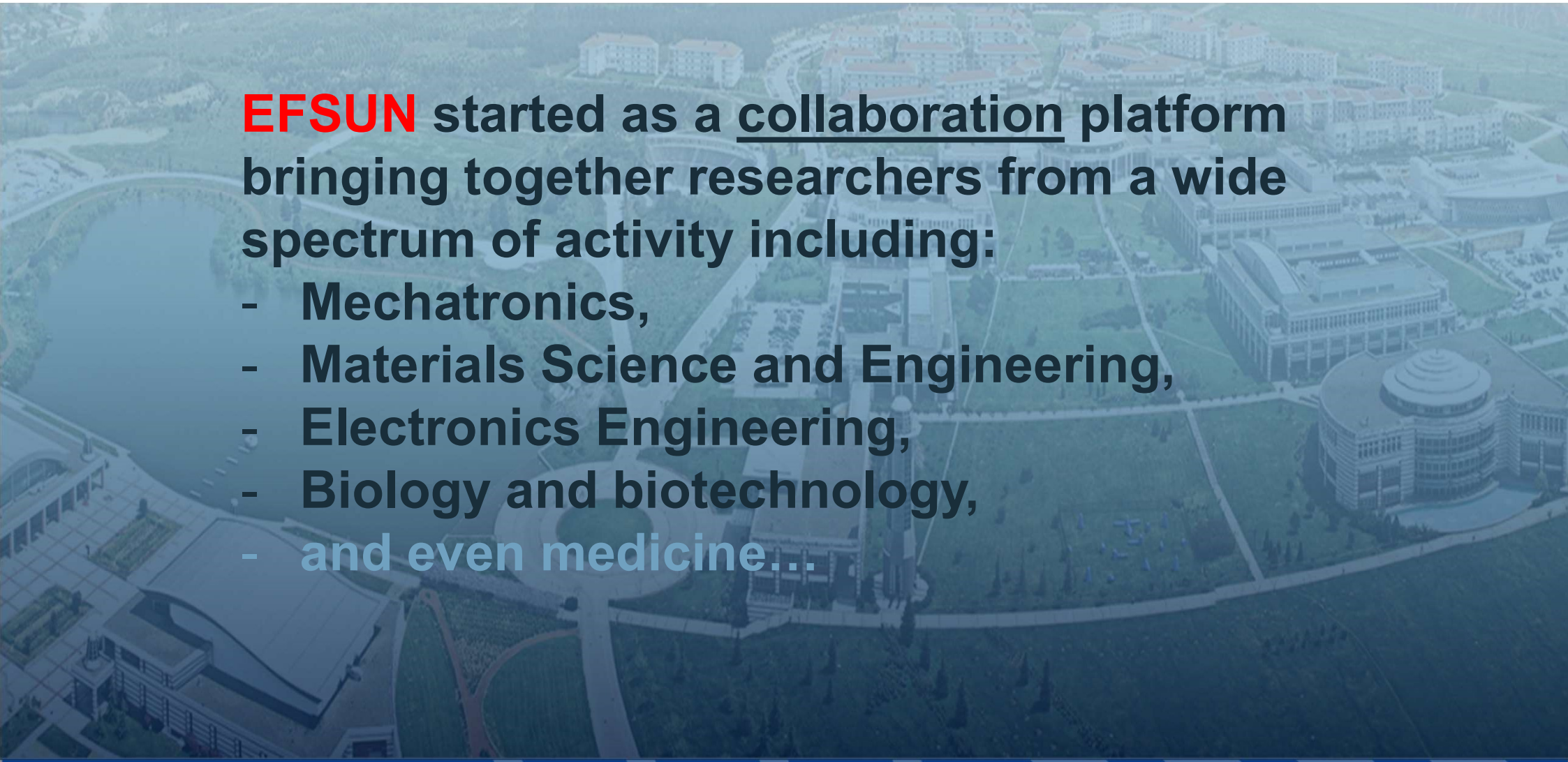
Number of Post Docs Su/SUNUM **6**

Number of Ph.D. Students SU/SUNUM **34**

Number of M.S. Students SU/SUNUM **22**

Objectives are:

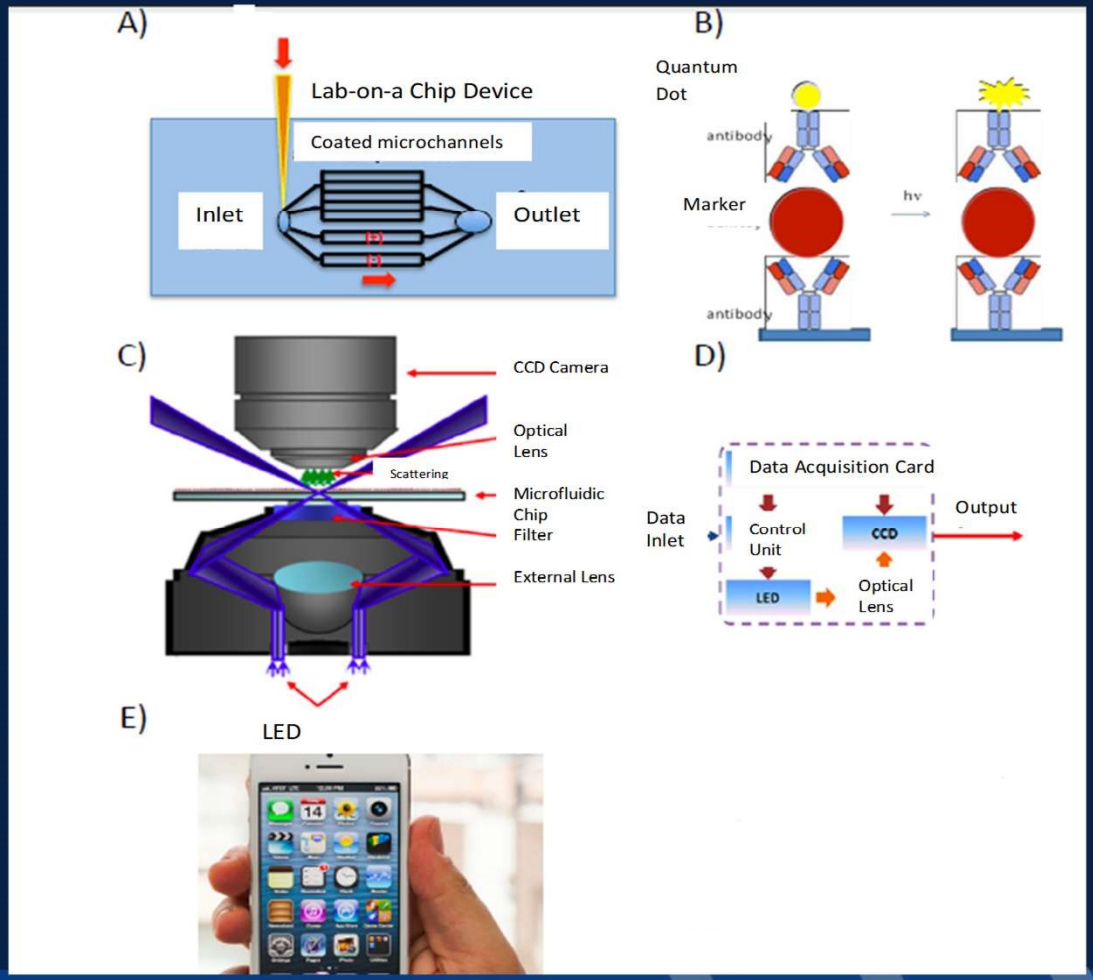
- to bring together highly qualified researchers to generate high impact research and original results with a focus on science and technology of interfaces and surfaces needed for novel devices for a number of applications.
- to become a “Center of Attraction” through its high impact research output that would get the attention of high quality researchers from around the world.
- to generate novel approaches and scientific knowledge on a very important and yet in-demand study area of new generation diagnostic tools in medicine.



EFSUN started as a collaboration platform bringing together researchers from a wide spectrum of activity including:

- Mechatronics,
- Materials Science and Engineering,
- Electronics Engineering,
- Biology and biotechnology,
- and even medicine…

Core research description



- The center addresses challenges in nano diagnostics through the usage of micron- and submicron sized systems exploiting the tools of materials development and science, nano technology, nano/microfluidics and power generation.
- The center focuses on an in-depth understanding of material fundamentals, surface and interface interactions that are vital to understand for novel IC devices and functional optpelectronic systems as well as heat and fluid flow with targeted device design.
- Design of nanodiagnostic tools also benefit from the gathered knowledge in conjunction with biotechnologists.

CoE for Functional SUrfaces and interfaces for Nano diagnostics / Research Outputs

Number of
Journal articles within 12 months SU/SUNUM

54

Granted Budget of
New Project Grants in 2020

22.064.000 TL

Number of
Applied and Granted Patents within 12 months

7

A demonstration of capacity for future plans…

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Some Achievements and Activities

Interdisciplinary Projects :

- NANOSIS-TUBITAK 1004-with cooperation of SUNUM-Representative Center for Sabanci University-“NANOSIS R&D and Innovation Collaboration Platform” with Research Program the research program titled “Development of Protein based Microfluidic Biochips for Diagnosis”. TÜBİTAK 1004, Partnership with SUNUM, 9,000,000 TL allocated for EFSUN
- The SUTAB Project: (Sabanci University Tissue Ablating Bubbles)-Medical Use of Small Scale Cavitating Flows, TUBITAK 1003, 1,000,000 TL
- Royal Academy of Engineering Newton Fund: Biphilic surfaces and Diagnosis based on Evaporation.
- The ongoing project budget is currently more than 4,000,000 Euro. The budget of pending project applications (under review) exceeds 4,000,000 Euro.

Recent Activities:

- EFSUN organized “Best Article Competitionon the 24th August 2020: https://gazetesu.sabanciuniv.edu/en/science-and-tech/winners-efsun-best-article-competition-announced
- The Winter Nanotechnology School for High School Students was held between 20 January and 24 January 2020 in cooperation with Sabancı University SUNUM and EFSUN Centers: https://gazetesu.sabanciuniv.edu/kampusten/kis-okullari-ile-lise-ogrencileri-teknolojiyi-tatilde-ogrendi

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CoE for Functional SUrfaces and interfaces for Nano diagnostics / Contributions

Contibutions to SU:

- EFSUN is a ‘Research Powerhouse’ at Sabanci University.
- EFSUN is a bridge between Sabanci University and SUNUM and contributes to the coordination activities.
- EFSUN provides valuable contributions to Schools for High School Students.
- EFSUN provides a stimulating environment for both scientists and students and significantly increases the visibility and ranking of SU.

Contributions to TURKEY:

- EFSUN is a ‘Center of Attraction’ for outstanding researchers and provides a collaboration platform in related research topics.
- EFSUN sets a very nice example for competitive interdisciplinary research in TURKEY.
- EFSUN is on its way to becoming a career development and training ground for young skilled scientists and engineers through its initiative MFAAM.

CoE for Functional SUrfaces and interfaces for Nano diagnostics / Future Directions

- We will hire our OWN researchers and would like to benefit from overheads of our OWN projects. We already have funding projects to channel to the CENTER upon approval by YÖK and TÜBİTAK.

- We are now eligible to apply to national and international project grants via our OWN CENTER with the help of some adjustments in regulations.

- We will apply to sizable Ministry of Science, Industry and Technology Infrastucture Grants and establish synergetic partnerships with the industry. Thus, an initative to establish our complementary laboratory facilities is being undertaken. A white paper for this initiative is under preparation and will soon be presented.

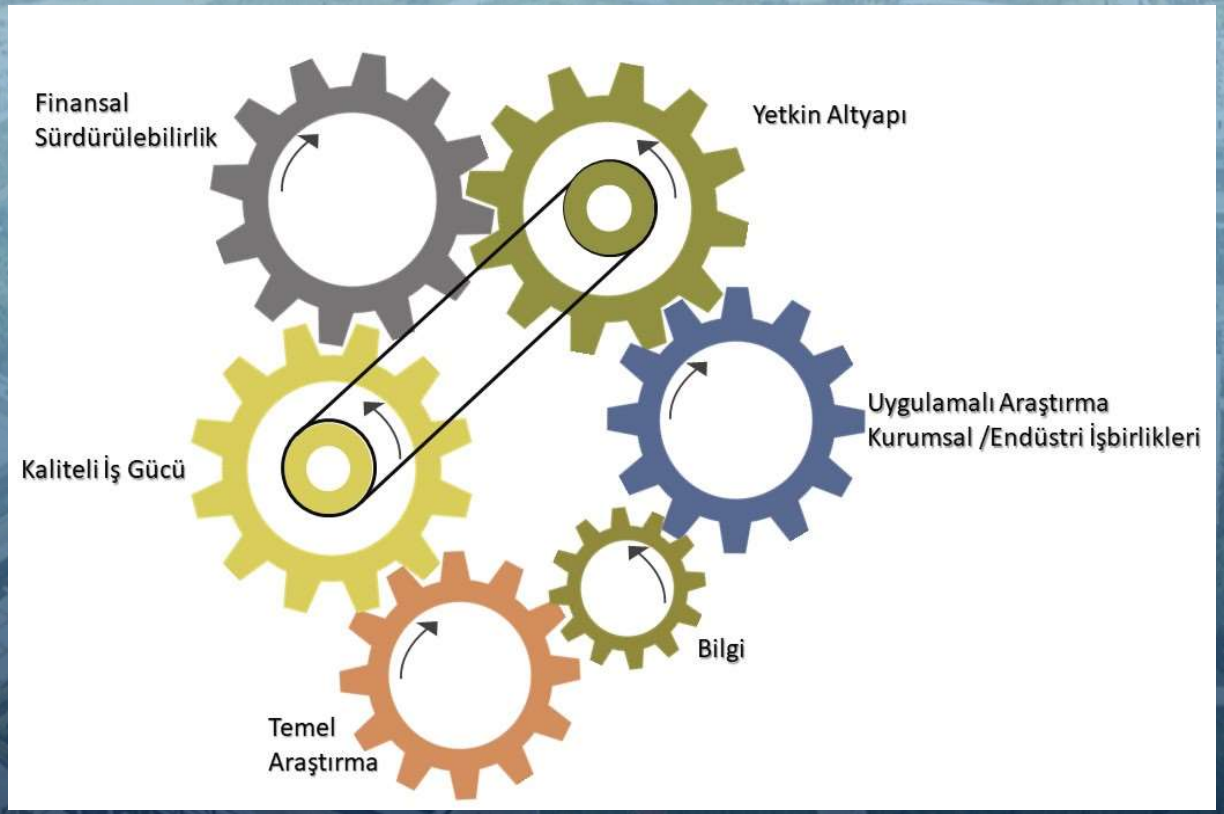
EFSUN
Materials Physics and Interfaces Research Center Initiative*

Motivation:

- To establish a **focused** research and application center targeting specific topics in science and technology that are directly related to interfaces and surfaces such as optoelectronics, energy generation&storage and thermal management.
- The planned infrastructure will bring capabilities and capacities that are non-existent at SU and its associated centers.
- The establishment will possess a natural setting for cooperation where the founding members of EFSUN, who have been collaborating since 2010 resulting in more than 50 SCI articles and more than 10 projects, will undertake cutting edge research and go the next mile.
- Researchers will attack problems both fundamental in nature and those related to industry that have been out of their reach concerning the applications related to their field of study.
- We foresee another KTMM type center where applied research in conjunction with **strategic partnerships with national and international industries as well as centers** along with fundamental research will be undertaken.
- The wide national and international network of the active EFSUN members will allow and drive an extensive research effort, benefiting the new initiative in maximizing output, serving the financial sustainability in addition to bringing new technologies and field of activities to SU and its centers.

* MFAAM: Malzeme Fiziği ve Arayüzeyler Araştırma Merkezi

EFSUN
Materials Physics and Interfaces Research Center Initiative



Mechanism analogue of MFAAM setup*: Effective applied and basic research is only possible with competent infrastructure and qualified manpower, and it is financial sustainability that empowers them in the long term. The functionality and effective use of competent infrastructure also depends on a motivated, qualified workforce.

* From the white paper on the MFAAM Initiative