

Sabancı
Universitesi

Center of Excellence for
**Functional SURfaces
and Interfaces for
Nano diagnostics
(EFSUN)**

**ACTIVITY
REPORT
2016-2017**

The Center of Excellence for Functional Surfaces and interfaces for Nano diagnostics (EFSUN) was established in September 2016. The Center aims at the discovery of efficient tools for an early, efficient accurate, cheap and on-site diagnosis of important health problems using nanotechnology tools. Highly qualified local researchers in various fields, including medicine, molecular biology, genetics, pathology, chemistry, physics, engineering, nanotechnology and electronics were brought together in the center in order to generate original, innovative and patentable knowledge and produce high impact research. Moreover, interdisciplinary nature of the center facilitates coordinated interactions between members from different fields to reach a common goal of generation of high-tech nano-based diagnostic devices. The advisory board consists of outstanding and experienced researchers from the best institutes and universities in the US and in Europe. As such, EFSUN has made a big progress in becoming a center of reference in the fields of nanotechnology and medical diagnostics in Turkey, in the region, and it always welcomes motivated researchers who would like to join forces to reach this goal.

The Center was founded by 5 scientists who were soon joined by 26 scientists who are world-class experts in their respective fields. Contributing members are recipients of various prestigious national and international awards. Collaborations with the industry are ongoing. 43 Ph.D. students and 32 M.S. students as well as 9 Post Doctoral Research Associates are benefitting from the stimulating and collaborative environment of the Center.

Within a short time, the Center became a 'Research Powerhouse' at Sabanci University. The research efforts and collaborations in the Center led to more than 90 journal publications in top journals between 2016-2017 (such as International Journal of Heat and Mass Transfer, Microfluidics and Nanofluidics, Applied Physics Letters, Nature Scientific Reports, Optics Express, etc.). 4 joint patents applications were made, 4 joint patent grants were obtained, and 3 start-up companies were established. Significant large scale grants were also obtained from both national and international resources within a year (more than 5,000,000 Euro). The members are self sustaining the Center and providing high impact outputs within the framework of the Center without any substantial support from Sabanci University.

This activity report is intended to provide a collection of the outputs of the center.

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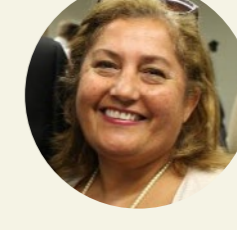
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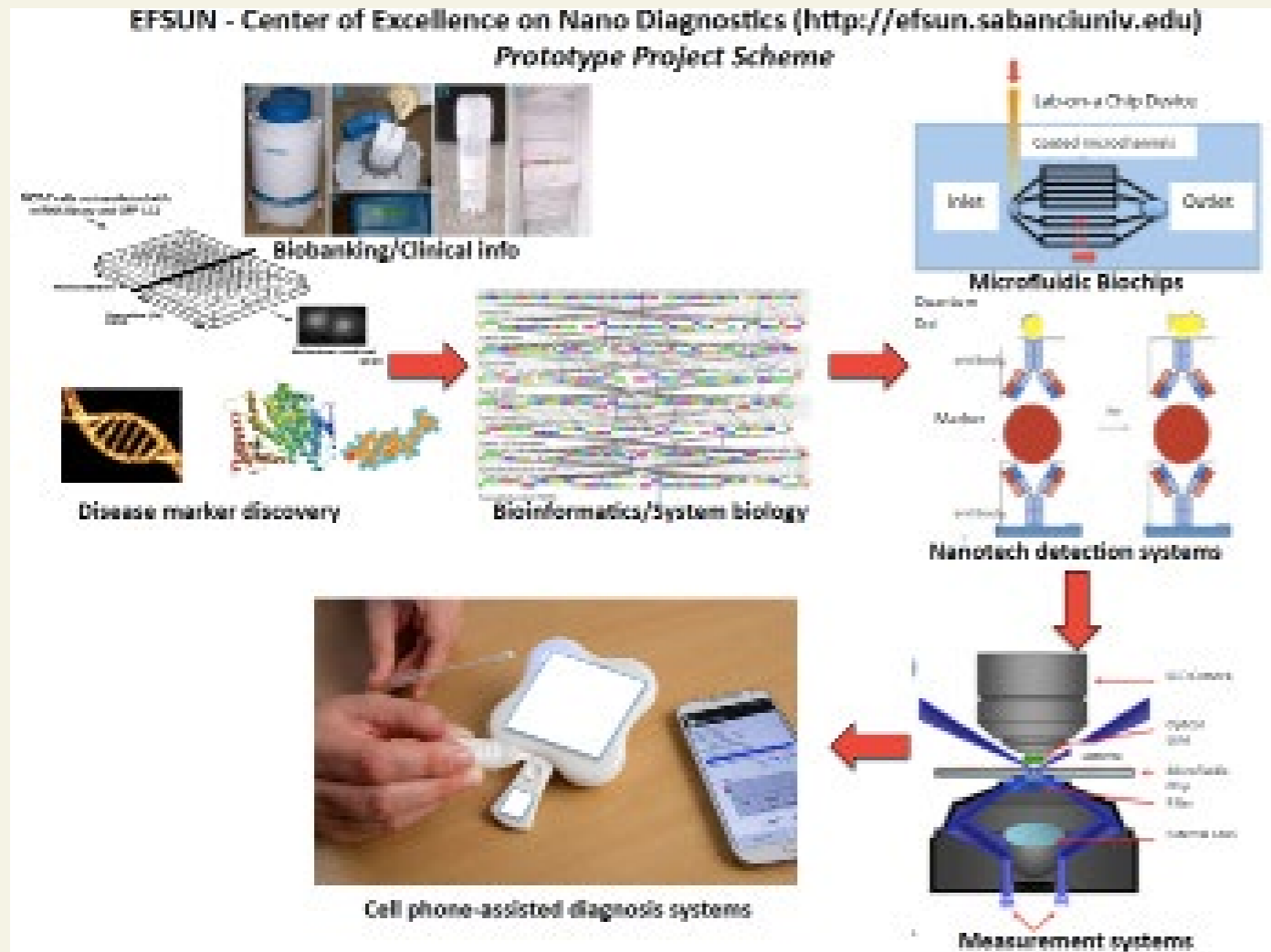
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The Prototype Project Scheme: Collaborative efforts of EFSUN Researchers who are experts in their respective fields, will allow creation of a cell phone-assisted platform for quick, cheap and accurate on-site detection and diagnosis of diseases. Clinical materials (tumors, various tissues, blood, urine, saliva etc) that are collected by clinical medical doctors, are analyzed using molecular tools (omics approaches, molecular biology, genetics, cell biology, biochemistry) and novel disease markers are discovered. Experts of bioinformatics and computational biology analyze the results of high-throughput omics approaches. Currently at least 5 protein and 5 RNA new and patentable markers of cancer were already discovered by EFSUN researchers, others are in the pipeline. Innovative microfluidic biochips are used in order to enrich, purify or separate cells and biomolecules in clinical materials. Using home-made antibodies, specially designed and functionalized nanoparticles and innovative physico-chemical detection approaches, EFSUN researchers are able to detect femto to subfemtomolar concentrations of disease markers. Signal detection is achieved using a home-made and patentable detection devices that process information in a cell phone and Cloud-assisted manner, and operating with a custom-designed application. Therefore, all components and parts of EFSUN Cell Phone-Assisted Diagnosis Systems are a result of cutting-edge science and technology.

EFSUN Center of Excellence: ***Fascination of science and technology, excellence in surfaces , interfaces and diagnostics.***

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Haluk Külâh
Microelectromechanical Systems

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- TÜBİTAK 1001 ‘Investigation of links and crosstalk between autophagy and stress responses’, 2017-2020, (Project No: 117Z244)
- TÜBİTAK (Korea Bilateral Cooperation Program Support, ‘Turkey-Korean international collaboration on the controlled bubble dynamics in magnetic nanofluids for the heat transfer enhancement ‘2017-2019, ((Project number: 216M416)
- TÜBİTAK (British Council Bilateral Newton Katip Celebi Cooperation Program Support) ‘Evaporated drop analysis, 2017-2019
- TÜBİTAK 1002 ‘Improvement and optimization of a novel computational method for the inference of cellular networks from omics data: Application to Stem Cells’, 2016, (Project Code: 215M201)
- TÜBİTAK 1003 ‘Bioinformatic analysis of transcriptome data and cellular networks for Parkinson’s Disease: Identification of novel drug targets and drugs’, 2017-2020,(Project Code: 315S302)
- TÜBİTAK 1003 ‘Non-small cell lung cancer, investigation of its pathogenesis via omics approaches’, 2017-2020, (Project No: 216S489)
- TÜBİTAK Bilateral Cooperation Project with Pakistan, ‘Constraint-based and Structure-based Analysis of Metabolic Pathways to Identify Potential Drug Targets against the Lethal Infectious Diseases originating from K. pneumoniae and S. enterica’ 2017-2020, (Project No: 316S005)
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- 'The investigation of molecular targets of Epibrassinolide and/or roscovitine as potential GSK3b inhibitors in Caenorhabditis elegans model organism' (COST Action BM1408 (GENIE), 2015-2018 (Project No: 115Z037)

Startup Companies

- Massive Dynamic
- PHI Tech Bioinformatics
- OptoFil A.Ş.

- Kick Off Meeting (26.11.2016)
- Project Team Building Event (04.02.2017)
- General Meeting and Iftar Dinner (20.06.2017)
- End of Year Meeting and Poster Competition will take place in November 2017



JOB OPENINGS

- EFSUN invites applications for Ph.D. students, post-doctoral research associate positions and technical staff.
- Candidates having experience on biology of diseases, material fundamentals, surface and interface interactions, power generation in small scale along with targeted device design are welcome.
- Please send a curriculum vitae, publication list, names and e-mail addresses of at least three referees and a motivation letter electronically to:

Professor **Ali Koşar** (kosara@sabanciuniv.edu)

Professor **Burc Mısırlıođlu** (burc@sabanciuniv.edu)

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