Halil Tekin

Position

PhD Candidate

PhD

Electrical Engineering and Computer Science – Bio-Electrical Engineering Area

Research area

Tissue engineering, stimuli-responsive platforms and high-throughput screening systems

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Supervisor's supporting comments

I am very pleased to nominate Halil Tekin for the *Bioanalysis* Young Investigator award. Halil has proven himself to be an excellent researcher, a very bright laboratory member and a strong leader since joining my laboratory. He has excelled at all of the skills required of a PhD candidate at MIT with his research focusing primarily on future advances in drug development, drug discovery and medicine with high-throughput drug toxicity screening. His efforts have focused on developing

novel biomimetic tissue constructs by microengineering methods to further advance the applications of implantable tissues and drug toxicity screening devices. Halil has demonstrated an unprecedented ability not only to learn new material quickly, but more importantly to synthesize new information and ask the important questions needed to move science forward. I am constantly impressed with Halil's ability, drive and determination in learning, and contributing to the research conducted in my laboratory. Halil's unique combination of a strong electrical engineering background and his current knowledge and experience in tissue engineering has enabled him to look at fundamental challenges in a novel and insightful way, which resulted in very interesting publications.

Halil is an exceptional PhD student conducting outstanding research in tissue engineering which can bring novel applications in human health care. Halil published a paper in a top journal in the field of microtechnology, *Lab on a Chip*, describing a new way of making cell aggregates and then retrieving them from the microwells in a controllable manner for further experimentation and analysis. He also published a paper in *Langmuir*, introducing a novel method to fabricate conformally coated thermo-responsive microgrooves to form stripe tissues and harvest them in a temperature-dependent manner. These responsive microstructures can be scalable into high-throughput systems and potentially be useful in tissue-engineering, stem cell research, drug toxicity screening and be integrated in bioanalytical devices. Currently, he is focusing on mimicking biological complexity in microtissues by utilizing dynamic microstructures. I am confident that by utilizing his unique expertise of stimuli-responsive materials, microfabrication techniques and cell biology Halil will continue to make outstanding contributions to this area.

Nominated by: Ali Khademhosseini, Harvard-MIT Health Sciences & Technology, Department of Medicine, Harvard Medical School, Brigham & Women's Hospital, Wyss Institute for Biologically Inspired Engineering, 65 Landsdowne Street, Rm 252, Cambridge, MA 02139, USA; Tel.: +1 617 768 8395; Fax: +1 617 768 8477; E-mail: alik@rics.bwh.harvard.edu

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Q What drove you to choose a career in bioanalysis?

Understanding the underlying mechanisms of how living systems operate appeals to me. Bioanalytical research plays an important role in understanding the biological systems and their response to different chemicals, which is crucial for the development of new drugs or therapeutics. One of my main interests is to design new bioanalytical tools to test drugs in a high-throughput manner which can be

potentially beneficial for the pharmaceutical industry by decreasing the cost and time required for drug discovery.

Q Describe the main highlights of your bioanalytical research & its importance to the bioanalytical community both now & in the future?

Drug discovery has been vastly improved due to new findings in synthetic chemistry, molecular biology and bioanalytical techniques. The clinical

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success of a new drug candidate depends on drug properties. Pharmaceutical companies are highly interested in using platforms where they can accurately estimate properties of a new drug candidate before clinical trials. Engineered tissues are of great interest since they can be used for various therapeutic applications. The pharmaceutical industry has been greatly interested in devices containing engineered tissue models because they can be used to test the drugs before animal trials. I aim to address these challenges by fabricating stimuli-responsive platforms to immobilize different cell types in a spatial organization to create modular tissue constructs. Stimuli-responsiveness of the platforms can be used to capture and release the cells or to change the device geometry to align different cell types in a controlled manner to mimic native tissue complexity. These tools could, potentially, be useful for creating high-throughput screening devices to test the metabolic profiles and toxicity of drug-like chemicals in order to determine the promising candidates for animal testing and preclinical trials.

Q Where do you see your career in bioanalysis taking you?

My goal is to complete my doctoral degree and to become a professor in one of the major institutes in the USA within the next few years. I would like to set up a laboratory where I can merge my bioengineering experience with my electrical engineering background to create new cell- and tissue-based bioanalytical high-throughput screening tools to be used in drug discovery. One of the main goals of my future career is to develop synthetic biological tools that mimic the biological complexity of the human body and can be used to screen drugs to replace animal studies or be used as diagnostic devices.

Q How do you envisage the field of bioanalysis evolving in the future?

The main goals of research are to ask fundamental questions, develop new techniques, design new tools and create new materials in order to make the world a better place. Bioanalytical research holds a prominent position in understanding nature and designing new methods and tools for improving human health. In the near future, the merging of different fields such as synthetic biology, systems biology and bioMEMS with bioanalysis could bring breakthroughs in bioanalytical research which could potentially accelerate the drug-discovery process. These advances could play an important role in improving therapeutics for human health.

Financial & competing interests disclosure

The author has no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

No writing assistance was utilized in the production of this manuscript.

Representative publications

- Tekin H, Tsinman T, Sanchez JG *et al.* Responsive micromolds for sequential patterning of hydrogel microstructures. *J. Am. Chem. Soc.* DOI: 10.1021/ja204266a (2011) (Epub ahead of print).
- Tekin H, Ince GO, Tsinman T *et al.* Responsive microgrooves for harvestable modular tissue constructs. *Langmuir* 27, 5671–5679 (2011).
- Tekin H, Anaya M, Brigham M, Nauman C, Langer R, Khademhosseini A. Stimuli-responsive microwells for formation and retrieval of cell aggregates. *Lab on a Chip* 10, 2411–2418 (2010).

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Each issue of *Bioanalysis* features a Young Investigator profile, where young bioanalysts have the opportunity to describe their work and future aspirations. At the end of each year a winner will be selected by the editorial advisory board and will be presented with a \$1000 award, sponsored by Waters. A travel fund is provided by Waters to assist with the cost of travel to the award ceremony.

For a young scientist, being recognized for your hard work at such an early stage in your career is a tremendous honor.

Young Investigators should be early career researchers, including Masters and Doctorate students, Postdoctorate researchers and those working in industry.

If you wish to nominate a Young Investigator, please contact the Editor for more details.

Ryan De Vooght-Johnson,
Junior Managing Commissioning Editor

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