
MEHMET BURCIN UNLU

PROFILE

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RESEARCH FIELDS (Lab with three postdocs, eight graduate, ten undergraduate students)

- Computational Biomedical Physics: Modeling, Image Reconstruction Algorithms, Physical Cancer Modeling, Computational Medicine
- Experimental Biomedical Physics and Imaging: Photo-acoustics, Optical Tomography, Ultrasound

APPOINTMENTS

PROFESSOR OF PHYSICS JUNE 2017-PRESENT

Bogazici University, Bebek Istanbul

Chair, Department of Physics (2018-2020)

VISITING PROFESSOR AUGUST 2018 - PRESENT

Hokkaido University, Sapporo, Japan

LECTURER FEBRUARY 2018-AUGUST 2018

GI-CoRE, **Hokkaido University**, Sapporo, Japan

VISITING SCHOLAR AUGUST 2017-AUGUST 2018

Laboratory of Artificial Intelligence for Medicine and Biomedical Sciences, Radiation

Oncology, **Stanford University**, School of Medicine, CA, USA

ASSOCIATE PROFESSOR OF PHYSICS 2011-2017

Bogazici University, Bebek Istanbul

ASSISTANT PROFESSOR OF PHYSICS 2010-2011

Bogazici University, Bebek Istanbul

ASSISTANT PROJECT SCIENTIST 2007-2009

Center for Functional Onco-Imaging, **University of California, Irvine**, CA, USA

POSTGRADUATE RESEARCHER 2004-2007

Center for Functional Onco-Imaging, **University of California, Irvine**, CA, USA

EDUCATION

<u>PHD PHYSICS</u>	2000-2004
Stevens Institute of Technology, Hoboken, NJ, USA	
<u>MS PHYSICS</u>	1996-1998
Bogazici University, Istanbul, TURKEY	
<u>BS PHYSICS</u>	1992-1996
Middle East Technical University, Ankara, TURKEY	

SELECTED GRANTS (> 5 million \$)

ONGOING RESEARCH SUPPORT (TURKEY)

NATO (Unlu-PI) Standoff Coherent Detection of Warfare Chemicals via Photoacoustic Spectroscopy

H2020-MSCA-ITN-2018 (Unlu-CoPI) Active Matter: From Fundamental Science to Technological Applications

TUBITAK 1003 (Unlu-PI) Prostat Kanseri İçin Kateter Tabanlı Fotoakustik Görüntüleme Sistemi Geliştirilmesi

TUBITAK 1001 (Unlu-PI) Nanoparçacıkların Foton/Proton Terapisine Olan Katkısının Akustik ve Fotoakustik Mikroskopla İncelenmesi

TÜBİTAK SAYEM (Unlu-CoPI) with VSY Biotechnology

COMPLETED RESEARCH GRANTS (TURKEY)

TUBITAK 1001 Kanser Tedavisinin Faydasını Optimize Edebilmek İçin Anti-Anjiyojenik İlaçların Hadron Tedavisi ve Kemoterapi ile Birleştirilmesinin Fiziksel Modellemesi

Turkish Ministry of Development - 2015BSV247 (Unlu - PI) Development of Multimodal Biomedical Microscopy Systems and Molecular Imaging Laboratory (3M-Lab)

British Council - Newton Fund 216415519 (Jones - PI University College London, Unlu - Co PI) Manipulation and Destruction of Cancer Cells Using Cavitation Bubbles by Optical and Acoustic Tweezers

Marie Curie International Reintegration Grants (IRG), PIRG07-GA-2010-268287 (Unlu-PI), DOT/MRI Dual-Modality Cancer Imaging Using a Bifunctional Contrast Agent
01/09/2010 - 31/08/2014

TUBITAK 1001 113F047 (Unlu-PI) A Novel Physical Model of Drug Delivery in Cancerous Tumors, 01/10/2013 - 30/09/2016

TUBITAK 1001 112T253 (Unlu-PI) Development of a Photoacoustic Microscopy System for Molecular Imaging of Tumor Angiogenesis 01/01/2013 - 01/01/2016 -

COMPLETED RESEARCH GRANTS (USA)

P30 CA-104548 (Nalcioglu, O. - PI) - 04/16/04 - 03/31/09, PHS/NIH National Cancer Institute

Role: Postgraduate Researcher (65%) Combined MR-Diffuse Optics for Functional Imaging

The long-term goal of the project was to construct an MR-compatible optical spectroscopic tomography system for improved spatial localization of optical measurements and accurate optical-MRI co-registration. I contributed to the development of an MR compatible multi-wavelength, multi-detector system and optimization of its performance.

R21 CA120175 (Gulsen, G - PI) - 07/01/07-06/30/11, NIH/NCI

Role: Investigator (15%) - Development of a Multi-Modality System for Onco-Imaging

This project developed a hybrid Near Infrared (NIR) and MRI dynamic imaging system with dual function NIR/MR contrast agents to detect and characterize tumors with a higher sensitivity and specificity than current imaging protocols.

R21 CA121568 (Su, M-Y - PI) - 07/01/07 - 06/30/09, NIH/NCI

Role: Postgraduate Researcher (20%) Combined MRI and Optical Imaging to Improved Breast Cancer Diagnosis

This project investigated the performance of a combined MRI and DOT (Diffuse Optical Tomography) system for improving diagnostic specificity of breast cancer with a small-scale clinical study.

SELECTED AWARDS (>10)

Fulbright Visiting Scholar Fellowship (2017-2018)

Excellence In Teaching Award, 2013 & 2017 - Bogazici University, Istanbul, TURKEY

PATENTS

Gulsen, G., Thayer, D., Yuting, L.I.N. and Unlu, M.B., The Regents Of The University Of California, 2015. Method and apparatus for photomagnetic imaging. U.S. Patent 9,078,587.

TEACHING

Phys101 (Mechanics), Phys102 (Optics&Thermo), Phys202 (Modern Physics), Phys201 (E&M), Phys290 (Numerical Methods), Phys301 (Classical Mechanics I), Phys302 (Classical Mechanics II), Phys311 (Advanced Modern Physics I), Phys 312 (Advanced Modern Physics II), Phys390, Phys337

(Medical Imaging Physics), Phys401 (E&M I), Phys402. (E&M II), Phys58M (Medical Imaging Physics)

SELECTED (2017-2022) PUBLICATIONS (>100)

Koyuncu, Batuhan, Ahmet Melek, Defne Yilmaz, Mert Tuzer, and Mehmet Burcin Unlu. "Chemotherapy response prediction with diffuser elapser network." **Scientific reports** 12, no. 1 (2022): 1-13.

Inanc, Medine Tuna, Irem Demirkan, Cemile Ceylan, Alper Ozkan, Ozcan Gundogdu, Utku Goreke, Umut A. Gurkan, and Mehmet Burcin Unlu. "Quantifying the influences of radiation therapy on deformability of human red blood cells by dual-beam optical tweezers." **RSC Advances** 11, no. 26 (2021): 15519-15527.

Debir, Birses, Cameron Meaney, Mohammad Kohandel, and M. Burcin Unlu. "The role of calcium oscillations in the phenotype selection in endothelial cells." **Scientific reports** 11, no. 1 (2021): 1-12.

Tanoren, Bukem, Ugur Parlatan, Melita Parlak, Berzem Selcuk, Fatma Ates Alkan, Nural Pastaci Ozsobaci, Gurcan Albeniz, Leyla Turker Sener, Isil Albeniz, and Mehmet Burcin Unlu. "Determination of modifications in rat liver due to phthalate uptake by SAM, RS, and ICP-OES." **Analytical Methods** 13, no. 26 (2021): 2926-2935.

Soysal, Kaan Batu, Seyma Parlatan, Metban Mastanzade, Murat Ozbalak, Mustafa Nuri Yenerel, Mehmet Burcin Unlu, Gunay Basar, and Ugur Parlatan. "Raman tweezers as an alternative diagnostic tool for paroxysmal nocturnal hemoglobinuria." **Analytical Methods** 13, no. 35 (2021): 3963-3969.

Tanoren, Bukem, Ugur Parlatan, Melita Parlak, Ibrahim Kecoglu, Mehmet Burcin Unlu, Didem Melis Oztas, Mustafa Ozer Ulukan, Korhan Erkanli, and Murat Ugurlucan. "Aortic aneurysm evaluation by scanning acoustic microscopy and Raman spectroscopy." **Analytical Methods** 13, no. 39 (2021): 4683-4690.

Nakamura, Yuta, Taisuke Takayanagi, Tomoki Uesaka, Mehmet Burcin Unlu, Yasutoshi Kuriyama, Yoshihiro Ishi, Tomonori Uesugi et al. "Range verification of pulsed proton beams from fixed-field alternating gradient accelerator by means of time-of-flight measurement of ionoacoustic waves." **Medical Physics** 48, no. 9 (2021): 5490-5500.

Altun, Burak, Irem Demirkan, Esin Ozturk Isik, Ozgur Kocaturk, Mehmet Burcin Unlu, and Bora Garipcan. "Acoustic impedance measurement of tissue mimicking materials by using scanning acoustic microscopy." **Ultrasonics** 110 (2021): 106274.

Takayanagi, Taisuke, Tomoki Uesaka, Yuta Nakamura, Mehmet Burcin Unlu, Yasutoshi Kuriyama, Tomonori Uesugi, Yoshihiro Ishi et al. "On-line range verification for proton beam

therapy using spherical ionoacoustic waves with resonant frequency." **Scientific Reports** 10, no. 1 (2020): 1-10.

Güzelçimen, F., Tanören, B., Çetinkaya, Ç., Kaya, M.D., Efkere, H.İ., Özen, Y., Bingöl, D., Sirkeci, M., Kınacı, B., Ünlü, M.B. and Özçelik, S., 2020. The effect of thickness on surface structure of rf sputtered TiO₂ thin films by XPS, SEM/EDS, AFM and SAM. **Vacuum**, p.109766.

Algarawi, M., Erkol, H., Luk, A., Ha, S., Ünlü, M.B., Gulsen, G. and Nouzi, F., 2020. Resolving tissue chromophore concentration at MRI resolution using multi-wavelength photo-magnetic imaging. **Biomedical Optics Express**, 11(8), pp.4244-4254.

Demirkan, I., Yaprak, G., Ceylan, C., Algul, E., Tomruk, C.O., Bilen, B. and Unlu, M.B., 2020. Acoustic diagnosis of elastic properties of human tooth by 320 MHz scanning acoustic microscopy after radiotherapy treatment for head and neck cancer. **Radiation Oncology**, 15(1), pp.1-10.

Guney, G., Uluc, N., Demirkiran, A., Aytac-Kiperil, E., Unlu, M.B. and Birgul, O., 2019. Comparison of noise reduction methods in photoacoustic microscopy. **Computers in Biology and Medicine**, 109, pp.333-341.

Takayanagi T, et. al. "A novel range-verification method using ionoacoustic wave generated from spherical gold markers for particle-beam therapy: a simulation study, **Scientific Reports** 9, no 1, 4011, (2019).

Bilen, Bukem, et. al. "Determination of Ultrastructural Properties of Human Carotid Atherosclerotic Plaques by Scanning Acoustic Microscopy, Micro-Computer Tomography, Scanning Electron Microscopy and Energy Dispersive X-Ray Spectroscopy." **Scientific reports** 9, no. 1 (2019): 679.

Bilen, Bukem, et. al. "Scanning Acoustic Microscopy and Time-Resolved Fluorescence Spectroscopy for Characterization of Atherosclerotic Plaques", accepted, **Scientific Reports**, (2018).

Uluc N., et al., "An extended photoacoustic transport model for characterization of red blood cell morphology in microchannel flow", in revision, **Biomedical Optics Express** (2018).

Demirkiran A., et al. "Analysis of micro cantilevers excited by pulsed-laser-induced photo acoustic waves", **Optics Express**, 26, 4, 4906, (2018).

Yonucu S, et al. "Quantifying the effects of antiangiogenic and chemotherapy drug combinations on drug delivery and treatment efficacy", **PLoS Comput Biol** 13(9): e1005724, (2017).

Alex Luk, Farouk Nouzi, Hakan Erkol, Mehmet Burcin Unlu, Gultekin Gulsen, Ex vivo validation of Photo-Magnetic Imaging, **Opt. Lett.** 42(20), 4171-4174,(2017).

Esra Aytac Kiperçil, Hakan Erkol, Serhat Kaya, Gultekin Gulsen and Mehmet Burcin Unlu,
"An Analysis of Proton-Acoustic Waves through an Analytical Approach" **Physics in
Medicine and Biology**, Volume 62, Number 12, (2017).