

Müjdat Balantekin, Ph.D.
Department of Electrical and Electronics Engineering
İzmir Institute of Technology
Urla, İzmir 35430, Turkey
Phone: +90-232-750-6524
Fax: +90-232-750-6599
E-mail: mujdatbalantekin@iyte.edu.tr

WORK EXPERIENCE

- **[2011 -] Assistant Professor, İzmir Institute of Technology**
 - Department of Electrical and Electronics Engineering
 - Courses: Electronics I-II, Introduction to Logic Design
- **[2009 - 2011] Instructor - Assistant Professor, Bahçeşehir University**
 - Department of Electrical and Electronics Engineering
 - Courses: Electronics I-II, Circuit Theory I-II, Electronic Devices and Circuits
- **[2005 - 2009] Postdoctoral Fellow, Georgia Institute of Technology**
 - Development of Active Atomic Force Microscope Probes with Integrated Interferometric Sensing and Electrostatic Actuation for High-speed Imaging and Quantitative Material Characterization at the Nanoscale
 - Development of Micromachined Transducer Arrays with Integrated CMOS Electronics for Real-time Volumetric Intravascular Ultrasound Imaging
- **[1999 - 2005] Teaching and Research Assistant, Bilkent University**
 - Department of Electrical and Electronics Engineering
 - Courses: Microwave Electronics, Analog Electronics, Wireless Communications, Electronics I-II, Circuit Theory

EDUCATION

- **[2005] Ph.D. in Electrical and Electronics Engineering, Bilkent University**
THESIS - “*Nanomechanical characterization of materials by enhanced higher harmonics of a tapping cantilever*” (Advisor: Prof. A. Atalar)
- **[2001] M.S. in Electrical and Electronics Engineering, Bilkent University**
THESIS - “*Design of driver electronics for 32 cantilevers in atomic force microscopy*”
- **[1999] B.S. in Electrical and Electronics Engineering, University of Gaziantep**

RESEARCH AREAS

- Micro-scale Sensors and Actuators
- Instrumentation for Nanotechnology
- High-speed Molecular Imaging
- Nano-scale Material Characterization
- Microsystems for Biomedical Applications

RESEARCH FUNDING

- **TÜBİTAK 3501**, National Young Researchers Career Development Programme, “Development of High-Speed, Actuatorless, and Dynamic Imaging Method for Atomic Force Microscopy Applications”, (2011-2013), **Principal Investigator**, 101,400 TL.

PEER-REVIEWED JOURNAL PAPERS

1. **M. Balantekin** and F. L. Degertekin, “Optimizing the driving scheme of a self-actuated atomic force microscope probe for high-speed applications”, *Ultramicroscopy*, vol. **111**, 1388 (2011).
2. Z. Parlak, R. Hadizadeh, **M. Balantekin**, and F. L. Degertekin, “Controlling tip-sample interaction forces during a single tap for improved topography and mechanical property imaging of soft materials by AFM”, *Ultramicroscopy*, vol. **109**, 1121 (2009).
3. R. O. Guldiken, **M. Balantekin**, J. Zahorian, and F. L. Degertekin, “Characterization of dual-electrode CMUTs: Demonstration of improved receive performance and pulse-echo operation with dynamic membrane shaping”, *IEEE Trans. Ultrason., Ferroelect., Freq. Contr.*, vol. **55**, 2336 (2008).
4. **M. Balantekin**, A. G. Onaran, and F. L. Degertekin, “Quantitative mechanical characterization of materials at the nanoscale through direct measurement of time-resolved tip-sample interaction forces”, *Nanotechnology*, vol. **19**, 85704 (2008).
5. A. G. Onaran, **M. Balantekin**, W. Lee, W. L. Hughes, B. A. Buchine, R. O. Guldiken, Z. Parlak, C. F. Quate, and F. L. Degertekin, “A new atomic force microscope probe with force sensing integrated readout and active tip”, *Rev. Sci. Instrum.*, vol. **77**, 23501 (2006), also published in the *Virtual Journal of Nanoscale Science & Technology*.
6. **M. Balantekin** and A. Atalar, “Enhanced higher-harmonic imaging in tapping-mode atomic force microscopy”, *Appl. Phys. Lett.*, vol. **87**, 243513 (2005), also published in the *Virtual Journal of Nanoscale Science & Technology*.
7. F. L. Degertekin, A. G. Onaran, **M. Balantekin**, W. Lee, N. A. Hall, and C. F. Quate, “Sensor for direct measurement of interaction forces in probe microscopy”, *Appl. Phys. Lett.*, vol. **87**, 213109 (2005), also published in the *Virtual Journal of Nanoscale Science & Technology*.
8. **M. Balantekin** and A. Atalar, “Enhancing higher harmonics of a tapping cantilever by excitation at a submultiple of its resonance frequency”, *Phys. Rev. B*, vol. **71**, 125416 (2005).
9. **M. Balantekin** and A. Atalar, “Power dissipation analysis in tapping-mode atomic force microscopy”, *Phys. Rev. B*, vol. **67**, 193404 (2003), also published in the *Virtual Journal of Nanoscale Science & Technology*.
10. **M. Balantekin** and A. Atalar, “Simulations of switching vibrating cantilever in atomic force microscopy”, *Appl. Surf. Sci.*, vol. **205**, 86 (2003).

PATENT

- F. L. Degertekin, A. G. Onaran, **M. Balantekin**, “Methods of Imaging in Probe Microscopy”, **US Patent 7,441,447**, October 28, 2008.

CONFERENCE PROCEEDINGS

1. A. Sisman, J. Zahorian, G. Gurun, M. Karaman, **M. Balantekin**, F. L. Degertekin, and P. Hasler, “Evaluation of CMUT Annular Arrays for Side-Looking IVUS”, **IEEE Ultrasonics Symposium**, pp. 2774-2777, Rome, Italy, September 2009.

2. **M. Balantekin** and F. L. Degertekin, "Accurate Modeling of Capacitive Micromachined Ultrasonic Transducers in Pulse-echo Operation", **IEEE Ultrasonics Symposium**, pp. 2107-2110, Beijing, China, November 2008.
3. G. Gurun, S. Qureshi, **M. Balantekin**, R. Guldiken, J. Zahorian, S. Y. Peng, A. Basu, M. Karaman, P. Hasler, and F. L. Degertekin, "Front-end CMOS Electronics for Monolithic Integration with CMUT Arrays: Circuit Design and Initial Experimental Results", **IEEE Ultrasonics Symposium**, pp. 390-393, Beijing, China, November 2008.
4. R. O. Guldiken, J. Zahorian, **M. Balantekin**, and F. L. Degertekin, "Dual-electrode CMUT Optimization for CMUTs with Uniform and Non-uniform Membranes", **IEEE Ultrasonics Symposium**, pp. 2096-2099, Beijing, China, November 2008.
5. J. Zahorian, R. Guldiken, G. Gurun, S. Qureshi, **M. Balantekin**, P. Hasler, and F. L. Degertekin, "Single Chip CMUT Arrays with Integrated CMOS Electronics: Fabrication Process Development and Experimental Results", **IEEE Ultrasonics Symposium**, pp. 386-389, Beijing, China, November 2008.
6. R. O. Guldiken, J. Zahorian, **M. Balantekin**, M. Karaman, and F. L. Degertekin, "Multiple Annular Ring Capacitive Micromachined Ultrasonic Transducer Arrays for Forward-Looking Intravascular Ultrasound Imaging Catheters", **ASME International Mechanical Engineering Congress and Exposition**, pp. 179-180, Seattle, WA, November 2007.
7. R. Guldiken, J. Zahorian, G. Gurun, S. Qureshi, **M. Balantekin**, C. Tekes, P. Hasler, M. Karaman, S. Carlier, and F. L. Degertekin, "Forward Looking-IVUS Imaging using a Dual-Annular-Ring CMUT Array: Experimental Results", **IEEE Ultrasonics Symposium**, pp. 1247-1250, New York, NY, October 2007.
8. J. Zahorian, R. Guldiken, G. Gurun, S. Qureshi, **M. Balantekin**, F. L. Degertekin, S. Carlier, A. Sisman, and M. Karaman, "Annular CMUT Arrays for Side Looking Intravascular Ultrasound Imaging", **IEEE Ultrasonics Symposium**, pp. 84-87, New York, NY, October 2007.
9. R. O. Guldiken, J. Zahorian, **M. Balantekin**, and F. L. Degertekin, "Design and Experimental Characterization of Dual-Electrode CMUT Array for Intra-Cardiac Ultrasound Imaging", **IEEE Ultrasonics Symposium**, pp. 416-419, New York, NY, October 2007.
10. F. L. Degertekin, **M. Balantekin**, and A. G. Onaran, "Quantitative Material Characterization and Imaging at Nanoscale using a New AFM Probe", **International Symposium on Acoustical Imaging**, pp. 215-222, Shonan Village, Japan, April 2007.
11. R. Guldiken, J. Zahorian, **M. Balantekin**, F. L. Degertekin, C. Tekes, A. Sisman, and M. Karaman, "Dual-Annular-Ring CMUT Array for Forward-Looking IVUS Imaging", **IEEE Ultrasonics Symposium**, pp. 698-701, Vancouver, Canada, October 2006.
12. R. O. Guldiken, **M. Balantekin**, and F. L. Degertekin, "Analysis and Design of Dual-Electrode CMUTs", **IEEE Ultrasonics Symposium**, pp. 581-584, Rotterdam, Netherlands, September 2005.

PRESENTATIONS & INVITED TALKS

1. **M. Balantekin**, "Active Atomic Force Microscope Probes for High-speed Imaging and Quantitative Material Characterization at the Nanoscale" (Invited Talk), **Institute of Materials Science & Nanotechnology, Bilkent University, Ankara, Turkey, May 2009.**
2. Z. Parlak, **M. Balantekin**, and L. Degertekin, "Real-time Topography and Mechanical Property Mapping of Soft Materials by FIRAT using Actively Controlled Transient Tap Forces", **MRS Spring Meeting, San Francisco, CA, April 2009.**
3. **M. Balantekin** and F. L. Degertekin, "Optimizing the Driving Scheme of the FIRAT-probe for High-speed Operation", **International Conference on Nanoscience and Technology, Keystone, CO, July 2008.**

4. G. Onaran, **M. Balantekin**, and F. L. Degertekin, “Active, Micromachined Probe Structures for Fast Atomic Force Microscopy and Material Property Characterization”, **Integration and Commercialization of Micro and Nanosystems International Conference & Exhibition, Kowloon, Hong Kong, June 2008.**
5. **M. Balantekin** and F. L. Degertekin, “Simulation of Large Signal Operation of Capacitive Micromachined Ultrasonic Transducers”, **International Workshop on Micromachined Ultrasonic Transducers, Trondheim, Norway, May 2008.**
6. R. Guldiken, J. Zahorian, **M. Balantekin**, and F. L. Degertekin, “Analysis of Dual-electrode CMUT Designs for Improved Operation and Performance”, **International Workshop on Micromachined Ultrasonic Transducers, Trondheim, Norway, May 2008.**
7. L. Degertekin, G. Onaran, **M. Balantekin**, and H. Torun, “Novel AFM Probes for Fast Imaging and Quantitative Material Characterization” (Invited Talk), **MRS Fall Meeting, Boston, MA, November 2007.**
8. F. L. Degertekin, P. Hasler, **M. Balantekin**, M. Karaman, A. Basu, R. Guldiken, G. Gurun, S. Peng, S. Qureshi, and J. Zahorian, “Design Optimization and Integrated Electronics for Dual Electrode CMUTs” (Invited Talk), **IEEE Ultrasonics Symposium, New York, NY, October 2007.**
9. L. Degertekin, G. Onaran, **M. Balantekin**, B. Van Gorp, and Z. Parlak, “A Fast AFM Probe with Integrated Interferometric Sensing and Electrostatic Actuation”, **ECS Meeting , Washington, DC, October 2007.**
10. F. L. Degertekin, A. G. Onaran, H. Torun, **M. Balantekin**, K. Sarangapani, and C. Zhu, “AFM Probe Structures with Integrated Interferometric Sensing and Electrostatic Actuation” (Invited Talk), **Kanazawa Workshop on Atomic Force Microscopy, Kanazawa, Japan, January 2007.**
11. **M. Balantekin**, A. G. Onaran, and F. L. Degertekin, “Extracting and Mapping Nanoscale Material Properties with TRIF-mode using FIRAT probe”, **International Conference on Nanoscience and Technology, Basel, Switzerland, July 2006.**
12. A. G. Onaran, **M. Balantekin**, and F. L. Degertekin, “An Active Membrane Based Probe Structure for Tapping Mode Atomic Force Microscope Imaging”, **International Conference on Nanoscience and Technology, Basel, Switzerland, July 2006.**
13. **M. Balantekin** and A. Atalar, “Mapping Nanoscale Material Elasticity using Higher Harmonics of a Tapping Cantilever”, **ESF Nanotribology Workshop, Antalya, Turkey, October 2003.**
14. **M. Balantekin** and A. Atalar, “Imaging Material Elasticity with Atomic Force Microscope”, **Scanning Probe Microscopy, Sensors and Nanostructures, Oxfordshire, UK, May 2003.**

PROFESSIONAL ACTIVITIES

- Panelist, Tübitak
- Reviewer, Physical Review Letters
- Reviewer, Physical Review B
- Reviewer, Ultramicroscopy