

# İ. BURÇ MISIRLIOĞLU

## CURRICULUM VITAE

*Associate Professor of Materials Science & Engineering*  
*Sabancı University*

Orhanlı-Tuzla 34956, İstanbul, Turkey

[burc@sabanciuniv.edu](mailto:burc@sabanciuniv.edu)

<http://people.sabanciuniv.edu/burc/>

Tel: 090 (216) 483 9562

Fax: 090 (216) 483 9550

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### **Academic Positions** *(In reverse chronological order)*

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#### **Sabancı University, May 2014 - Present**

Associate Professor in Materials Science and Engineering Program, Faculty of Engineering and Natural Sciences.

#### **Sabancı University, September 2008 - May 2014**

Assistant Professor in Materials Science and Nano Engineering Program, Faculty of Engineering and Natural Sciences.

#### **Massachusetts Institute of Technology, November 2007- August 2008**

Post-doctoral associate in the Department of Nuclear Science & Engineering. Research was carried out on transport mechanisms in electrochemically active oxide cathode materials for solid oxide fuel cells. Experimental studies emphasized the impact of microstructure and processing conditions on the electronic and ionic transport properties of perovskite oxide cathodes grown on solid electrolytes via electrical and structural characterization. The project was funded by the U.S. Department of Energy.

#### **Max Planck Institute of Microstructure Physics, October 2006-November 2007**

Post-doctoral researcher under the sponsorship of the Alexander von Humboldt Foundation. Activities included growth of ferroelectric superlattice structures, their electrical characterization and impact of interfaces on observed properties such as polarization anisotropy and dielectric response.

### **Education**

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#### **Ph.D. in Materials Science and Engineering**, University of Connecticut, July 2006.

Thesis title: Stress Relaxation and Phase Transformations in Ferroelectric Heterostructures.

#### **M.Sc. in Materials Science**, Istanbul Technical University, July 2001.

Thesis title: Microstructural and Chemical Deactivation Mechanisms of Catalytic Converters for Gasoline Engines.

#### **B.Sc. in Metallurgical Engineering**, Istanbul Technical University, February 1998.

Senior year project: An experimental approach to increase the ductility of Al-Si die cast alloys via grain refinement.

## Awards and Honors

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Science Academy, Young Scientist Program Award (BAGEP), 2014.

The Scientific and Technological Research Council of Turkey (TÜBİTAK), Young Investigator Incentive Award in Engineering, 2013.

Middle Eastern Technical University (ODTÜ) Prof. Mustafa Parlar Incentive for Research Award, 2012.

Turkish Academy of Sciences Young Investigator Award (TÜBA GEBİP), 2011.

Outstanding graduate thesis award of School of Engineering, University of Connecticut, 2006.

Alexander von Humboldt Fellow at the Max Planck Institute of Microstructure Physics (October 2006 – October 2007).

Outstanding Graduate Student at the Materials Science and Engineering Department, University of Connecticut (2005).

ASM Hartford Chapter Speaking Contest First Prize Award (2005).

## Academic Service at Sabancı University

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Seminar coordinator and organizer of the Materials Science and Engineering Program between 2008 and 2012.

Coordinator for the Materials Science and Nano Engineering Program Ph.D. qualification exam since 2008 (Offered at the end of each Fall and Spring Semesters).

Coordinator and lead lecturer of the “Material Characterization Methods” module in the Nanotechnology Master of Engineering Program in Fall of 2013 (8 week lecture, 3 hours a week).

Lecturer of “Materials Science and Nanotechnology” in Summer School for High School Students (2 week lecture in Summer of 2016, 4 weeks in Summer of 2017 and 2018).

European Credit Transfer System (ECTS) accreditation representative for the Materials Science and Engineering Program since 2012.

Member of the Faculty of Engineering and Natural Sciences disciplinary committee since September 2008.

*Other*

Management Committee Member of the European COST action “Single and Multi phase ferroics in restricted geometries (SIMUFER)”, 2012-2014.

## Students Advised

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Ludwig Geske (Feigl as of 2007), Ph. D 2008, co-advised at the Max Planck Institute of Microstructure Physics. Thesis topic: Formation of elastic domains and their contribution to properties in  $\text{PbZr}_x\text{Ti}_{1-x}\text{O}_3$  multilayers. Now research scientist at Ecole Polytechnique Federale de Lausanne, Switzerland.

Hale Nur Çöloğlu, M. Sc. 2011, Sabancı University. Thesis topic: Formation of electrical domains in ferroelectric thin films with depletion charges. Now project engineer at National Nanotechnology Research Center (UNAM), Bilkent University, Ankara, Turkey.

Özgün Kocabiyık, B.Sc. 2011, Sabancı University, Senior year project: Sythesis and characterization of magnetofluids for actuated flow in microchannels. Now Ph.D candidate at Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland.

Hamidreza Khassaf, M. Sc. 2012, Sabancı University. Thesis topic: Effect of A-site doping on leakage current behavior of sol-gel synthesized BiFeO<sub>3</sub> thin films. Obtained his Ph.D. at the University of Connecticut (successfully passed the qualify), CT, USA, now post-doc

Mohammadreza Khodabakhsh, M. Sc. 2014, Sabancı University. Thesis topic: Strong dependence of phase transition behavior of sol-gel synthesized BiFeO<sub>3</sub> on ionic radii of A-site dopants. Now Ph.D. student at Koç University, Materials Science Program, Istanbul, Turkey.

Omid Mohammadmoradi, M. Sc. 2017, Sabancı University. Thesis topic: Ba<sub>1-x</sub>Sr<sub>x</sub>TiO<sub>3</sub> thin films as ferroelectric Schottky diodes: Experimental observation of strong resistive switching and its thermodynamic analysis. Now Ph.D. student at Sabancı University, İstanbul, Turkey, co-advised with Prof. Gözde İnce.

Canhan Şen, Ph.D. student, Sabancı University, on-going since Fall of 2012. Canhan is working on spin dependent carrier density control at ferroelectric-ferromagnetic semiconductor interfaces for low power spintronic transistor applications.

Wael Ali Saeed Abdulaimi, Sabancı University, as of Spring of 2018 (co-advised with Prof. Özge Akbulut). Wael's research focuses on electroresistance of vortex type magnetic ordering in nanodisks.

## **Projects & Funding History (at Sabancı University, in reverse chronological order)**

Co-PI, (with Prof. Ebru Alkoy of Gebze Technical University, Gebze, Turkey) titled “Investigation of the effect of crystallographic anisotropy and defects on the electrocaloric response of stress-free relaxor ferroelectric plates by experimental and analytical techniques” granted by the United States Air Force Office of Scientific Research (USAF AFOSR) in May of 2018 (budget: 210000 USD for 3 years).

PI, The The Scientific and Technological Research Council of Turkey 1001 Project, granted as of July 2017: “Control of magnetic orientation and electroresistance of nano structures with vortex magnetism”, (budget granted: 120000 USD).

PI, The Scientific and Technological Research Council of Turkey 1001 Project, active as of April 2017: “Development of a non-destructive and low power read-out ferroelectric memory using a multilayered approach”, (budget granted: 120000 USD).

Co-PI, The Scientific and Technological Research Council of Turkey 1003 Project, “Smart composite panels for efficient heat insulation around the year” in cooperation with industrial partners, granted in late 2015 (budget granted: 1000000 USD).

PI, under European COST action project titled SIMUFER (Single and Multiphase Ferroics in Restricted Geometries) granted in January 13, 2014 for a duration of 30 months, (budget granted: 190000 USD): “Submicron Ba,Sr,TiO<sub>3</sub> thin films for second harmonic generation and dependence of their functionality on electrical boundary conditions”.

PI, The Scientific and Technological Research Council of Turkey Young Researcher Incentive Award (2013, 15000 USD): For studies of ferroelectric films and their domain structures under various boundary conditions.

PI, funded collaboration with Prof. Arkadi P. Levanyuk (2-4 months duration in 2010, 2012, 2013, funded by The Scientific and Technological Research Council of Turkey and Sabancı University, 20000 USD): Phase transition behavior of ferroelectric-paraelectric superlattices, study of single and multidomain stabilities near and far below the transition temperature.

PI, Young Investigator Research Award (2011 May-2014 May, granted by the Turkish Academy of Sciences, 36000 USD): Study of the properties of ferroelectric thin films within the wide bandgap semiconductor consideration and ferroelectric-paraelectric superlattices for high density charge storage and tunable device applications.

PI, Research Project (Completed in 2012, funded by The Scientific and Technological Research Council of Turkey, 180000 USD): Wet method fabrication and characterization of multiferroic BiFeO<sub>3</sub> thin films.

## Previous Work Experience (1999-2006)

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Research associate, Spring and Summer of 2006, University of Connecticut, USA.

Research Assistant, 2001-2006, Department of Materials Science & Engineering, University of Connecticut, CT, USA.

Webmaster, 2001-2004, Department of Materials Science & Engineering, University of Connecticut, CT, USA.

Research Assistant, 1999-2001, Materials Science Division, Istanbul Technical University, Istanbul, Turkey.

## Research Interests

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Synthesis and growth of functional oxides in both bulk and thin film form via chemical and plasma sputtering methods followed by structural, electrical and thermodynamic characterization to correlate the physical properties such as transition temperatures to powder size, film thickness and microstructure. Microstructural methods include XRD, Raman Spectroscopy, Scanning and Transmission Electron Microscopy methods.

Dielectric, semiconducting and optical properties of ferroelectric oxides. Tailoring of ferroelectrics in design of low power consuming non-volatile, non-destructive read-out memories and switch elements in integrated circuits as well as active components in pyroelectric sensors and high density capacitors.

Materials modeling and simulation, electrostatics of materials, application of numerical methods in continuum media and complex analytical formulations with no definite exact solutions. Monte-Carlo methods to study phase transitions in homogeneous and inhomogeneous systems.

Physical and electrical properties of artificially fabricated multilayer oxides/superlattices, size and defect effects in these systems, experimental studies of structure-property relationship in superlattices, prediction and design of new properties in these materials.

Thermodynamics of phase transformations in bulk and thin film structures as well as solid solutions and alloys, application of the Landau-Ginzburg theory of phase transitions to solids. Effect of elasticity and elastic instability on the inhomogeneous nature of phase transitions and evolution of the order parameter of the transition.

## Reviewing and Editorial activities (2008-Recent)

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Reviewed articles for Thin Solid Films, Journal of Materials Science, Journal of Materials Research, Applied Physics Letters, Journal of Applied Physics, Materials Chemistry and Physics, IEEE Transactions on Electron Devices, ACS Applied Materials & Interfaces, Scripta Materialia, IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control, Acta Materialia, Physica Status Solidi A, Scientific Reports.

Editorial Board Member of the journal Scientific Reports (Nature Publishing Group) since July 2016.

## List of Publications

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*(60 SCI publications as of 06.21.2018, 850 citations, 743 times cited by others, h index of 17 in Web of Science, 63 publications in Scopus with 883 citations and h-index of 17, 1162 citations and h index of 18 in Google Scholar)*

*Ongoing work (Activity initiated in Spring of 2017, submission of the work anticipated in 2018)*

“Phase co-existence due to elastic instability in thin films undergoing structural symmetry breaking transitions”, A. P. Levanyuk, S. A. Minyukov and I. B. Misirlioglu. (In this work we analyze the thermodynamics of phase co-existence that is crucial in understanding elastic stability of a thin film undergoing a structurally symmetry breaking transition. We carry out a rigorous analysis for a material slab clamped on a substrate where elastic instability, i. e., the change of sign of the elastic modulus in the ordered or low symmetry phase could occur before the thermodynamic phase transition into this phase from the disordered or the high symmetry phase. This process is analogous to the supercritical behavior of CO<sub>2</sub> where sign of compressibility becomes positive above a critical temperature, driving the co-existence of liquid and gas phases. Co-existence of the low symmetry and high symmetry phase in solid films in a range of temperatures appears favorable as this lowers total free energy of the system. Implications of such an outcome are discussed for transition anomalies and physical properties).

“Switching of vortex-type ordered ferromagnetism via time varying electric fields in dielectric/ferromagnet nanodisk stacks”, I. B. Misirlioglu and K. Sendur. (In this work we pursue an idea to enable writing of data bits on ferromagnetic nanodisks in an unconventional manner that could lead to further downscaling of solid state magnetic based memories with ultra-low power consumption.)

“Phase transitions in ultrathin ferroelectric films without electrodes: Experiment and Theory”, A. P. Levanyuk and I. B. Misirlioglu. (In this study we take the problem of phase transition in a ultrathin ferroelectric film in the absence of electrodes and analyze the thickness and boundary condition dependency of the transition temperatures followed by detailed comparison with experiments, probing the limits of ferroelectric stability in the absence of electrodes.)

“Control of spectral reflectivity of VO<sub>2</sub> nanostructures via tailoring geometrically sensitive scattering”, M. Ertas, R. A. Yalcin, I. B. Misirlioglu and K. Sendur. (In this work we were able to control the size of textured VO<sub>2</sub> nano islands on Si and obtain size dependent spectral reflectivity in temperature dependent ellipsometry. Experimental results backed by electromagnetic scattering calculations reveal a highly unconventional reflectivity response of VO<sub>2</sub> nanostructures in the visible and near IR regimes controlled by size of the particle deposits rather than the intrinsic insulator-to-metal transition that governs reflectivity above 68°C.)

*Submitted*

“Plasmonics with semiconductor heterojunctions: Low loss waveguides and band filters”, M. Janipur, I. B. Misirlioglu and K. Sendur. (Here, we show that the depletion zone in symmetric or asymmetric doped sub-micron p-n junctions can have a tunable and unconventional plasmonic response to THz excitation. Quite interesting resonances are calculated that are not possible in metal/dielectric systems. This work proposes to use p-n junctions as THz frequency and far IR filters and switches.)

“Change of local density of states and loss of spin polarization in ferromagnet/ferroelectric junctions”, C. Sen, O. M. Mohammadmoradi and I. B. Misirlioglu. (In this work we treat a ferroelectric/ferromagnetic junction in the continuum media limit and reveal the spin dependent depletion and accumulation process in screening of polarization charges at the interfaces, a magnetoelectric effect that has very recently attracted interest in submicron stacks. Comparisons with experiments are made, the general observation of the decrease in the TMR currents are discussed in the light of tunneling currents for up- and down-spins we compute).

*Journal Articles (in reverse chronological order)*

1. M. Ertas, I. B. Misirlioglu and K. Sendur, ““Selective IR reflectivity in highly textured phase change VO<sub>2</sub> thin films grown via oxidation of metallic V films on substrates” accepted for publication in OSA Optical Materials Express, 2018.
2. O. Mohammadmoradi, C. Sen, G. A. Boni, L. Pintilie and I. B. Misirlioglu, “Strong composition dependence of resistive switching in Ba<sub>1-x</sub>Sr<sub>x</sub>TiO<sub>3</sub> thin films on semiconducting substrates and its thermodynamic analysis”, Acta Materialia, 148, 1-13 (2018).
3. A. P. Levanyuk, S. Minyukov and I. B. Misirlioglu, “Loss of elastic stability and formation of inhomogeneous states at phase transitions in thin films on substrates”, in press, Ferroelectrics, 2018.
4. E. S. Kocaman, E. Akay, C. Yilmaz, G. Bektas, H. Türkmen, I. B. Misirlioglu and M. Yildiz, “Monitoring damage state of fiber reinforced composites using a fiber Bragg grating network combined with temperature measurements”, MDPI Materials, 10, 32 (2017).
5. I. B. Misirlioglu and S. P. Alpay, “Compositionally Graded Ferroelectric Stacks as Wide Bandgap Semiconductors: Domain Stabilities, Dielectric Properties and Origin of Low Loss”, Acta Materialia 122, 266 (2017).
6. A. P. Levanyuk, S. Minyukov and I. B. Misirlioglu, “Negative bulk modulus and loss of elastic stability near tricritical transitions in thin films on substrates”, in the 500<sup>th</sup> Special Issue of Ferroelectrics (2016).
7. M. Janipur, I. B. Misirlioglu and K. Sendur, “Tunable surface plasmon and phonon polariton interactions for moderately doped semiconductor surfaces”, Scientific Reports 6, 34071 (2016).
8. I. B. Misirlioglu and K. Sendur, “Ferroelectric/semiconductor/tunnel-junction stacks for non-destructive and low power read-out memory”, IEEE Transactions on Electron Devices 63, 2374 (2016).
9. A. P. Levanyuk, I. B. Misirlioglu, “Strong influence of non-ideality of electrodes on stability of single domain state in ferroelectric-paraelectric superlattices”, Journal of Applied Physics 119, 024109 (2016).
10. I. B. Misirlioglu, M. Yildiz and K. Sendur, “Domain control of carrier density in a ferroelectric-semiconductor interface”, Scientific Reports, 5, 14740 (2015).
11. I. B. Misirlioglu, C. Sen, M. T. Kesim and S. P. Alpay, “Low voltage ferroelectric-paraelectric superlattices as gate materials for field effect transistors”, online in 50<sup>th</sup> Anniversary Issue of Journal of Materials Science (2015).
12. Y. Espinal, M. T. Kesim, I. B. Misirlioglu, S. Trolrier-McKinstry, J. V. Mantese, and S. P. Alpay, “Pyroelectric and Dielectric Properties of Ferroelectric Films with Interposed Dielectric Buffer Layers”, Applied Physics Letters 105, 232905 (2014).
13. I. B. Misirlioglu, M. T. Kesim and S. P. Alpay, “Layer thickness and period as design parameters to tailor pyroelectric properties in ferroelectric superlattices”, Applied Physics Letters 105, 172905 (2014)

14. I. B. Misirlioglu and M. Yildiz, “Carrier accumulation near electrodes in ferroelectric films due to polarization boundary conditions”, *Journal of Applied Physics* 116, 024102 (2014).
15. M. Khodabakhsh, C. Sen, H. Khassaf, M. A. Gulgun and I. B. Misirlioglu, “Strong smearing and disappearance of phase transitions into polar phases due to inhomogeneous lattice strains induced by A-site doping in  $\text{Bi}_{1-x}\text{A}_x\text{FeO}_3$  (A: La, Sm, Gd)”, *Journal of Alloys and Compounds*, 604, 117 (2014).
16. I. B. Misirlioglu, M. T. Kesim and S. P. Alpay, “Strong dependence of the dielectric properties on layer period and interfaces in ferroelectric superlattices”, *Applied Physics Letters* 104, 022906 (2014).
17. M. T. Kesim, M. W. Cole, J. Zhang, I. B. Misirlioglu and S. P. Alpay, “Tailoring Dielectric Properties of Ferroelectric-Dielectric Multilayers”, *Applied Physics Letters* 104, 022901 (2014).
18. I. B. Misirlioglu and M. Yildiz, “Very large dielectric response from ferroelectric nanocapacitor films due to collective surface and strain relaxation effects”, *Journal of Applied Physics*, 114, 194101 (2013).
19. A. P. Levanyuk and I. B. Misirlioglu, “Phase transitions in ferroelectric-paraelectric superlattices: Single domain state stability”, *Applied Physics Letters*, 103, 192906 (2013).
20. I. B. Misirlioglu and M. Yildiz, “Dielectric response of fully and partially depleted ferroelectric thin films and inversion of the thickness effect”, *Journal of Physics D*, 46, 125301 (2013).
21. A. P. Levanyuk, I. B. Misirlioglu, E. Mishina and A. Sigov, “Effects of depolarizing field in perforated film of two-axial ferroelectric”, *Physics of the Solid State*, 54, 2243, (2012).
22. E. Kurtoglu, A. Bilgin, M. Sesen, I. B. Misirlioglu, M. Yildiz, H. F. Y. Acar and A. Kosar, “Ferrofluid actuation with varying magnetic fields for micropumping applications”, *Microfluidics and Nanofluidics*, DOI 10.1007/s10404-012-1008-5, (2012).
23. H. Khassaf, C. Dragoi, I. Pintilie, I. B. Misirlioglu and L. Pintilie, “Potential barrier increase due to Gd doping of  $\text{BiFeO}_3$  layers in  $\text{Nb:SrTiO}_3\text{-BiFeO}_3\text{-Pt}$  structures displaying diode-like behavior”, *Applied Physics Letters*, 100, 252903, (2012).
24. J. Zhang, I. B. Misirlioglu, G. A. Rosetti and S. P. Alpay, Electrocaloric properties of epitaxial strontium titanate films, *Applied Physics Letters*, 100, 222909, (2012).
25. I. B. Misirlioglu, H. N. Cologlu and M. Yildiz, “Thickness driven stabilization of saw tooth-type domains in ferroelectric films with depletion charge”, *Journal of Applied Physics*, 111, 064105 (2012).
26. I. B. Misirlioglu and M. Yildiz, “Polarization retention and switching in ferroelectric nano capacitors with defects on tensile substrates”, *Solid State Electronics*, 67, 38 (2012).
27. A. P. Levanyuk and I. B. Misirlioglu, “Phase transitions in ferroelectric-paraelectric superlattices”, *Journal of Applied Physics*, 110, 114109 (2011).
28. I. B. Misirlioglu, M. B. Okatan and S. P. Alpay, “Effect of asymmetrical interface charges on the hysteresis and domain configurations of ferroelectric thin films”, *Integrated Ferroelectrics*, 126, 142 (2011).
29. M. B. Okatan, I. B. Misirlioglu, S. P. Alpay, “Contribution of space charges to the polarization of ferroelectric superlattices and its effect on dielectric properties”, *Physical Review B*, 82, 094115 (2010).
30. I. B. Misirlioglu, M. B. Okatan and S. P. Alpay, “Asymmetric hysteresis loops and smearing of the dielectric anomaly at the transition temperature due to space charges in ferroelectric thin films”, *Journal of Applied Physics*, 108, 034105 (2010).

31. I. B. Misirlioglu, L. Pintilie, M. Alexe and D. Hesse, "Influence of long-range dipolar interactions on the phase stability and hysteresis shapes of ferroelectric and antiferroelectric multilayers", DOI 10.1007/s10853-009-3451-6, special issue of Journal of Materials Science on Ferroelectrics, (2009).
32. I. B. Misirlioglu, "Stability of a ferroelectric phase with electrical domains in multilayers", Applied Physics Letters, 94, 172907 (2009).
33. L. Geske, I. B. Misirlioglu, I Vrejoiu, M. Alexe and D. Hesse, "Impact of misfit relaxation and a-domain formation on the electrical properties of tetragonal Pb Zr<sub>0.4</sub> Ti<sub>0.6</sub>O<sub>3</sub> / Pb Zr<sub>0.2</sub> Ti<sub>0.8</sub>O<sub>3</sub> thin film heterostructures: Experiment and theoretical approach", Journal of Applied Physics, 105, 061607 (2009).
34. G. Akcay, I. B. Misirlioglu and S. P. Alpay, "Phase transformation characteristics of Barium Strontium Titanate films on anisotropic substrates with (110)//(001) epitaxy", Integrated Ferroelectrics, 101, 29 (2009).
35. I. B. Misirlioglu, G. Akcay and S. P. Alpay, "Low-temperature monoclinic phase in epitaxial (001) Barium Titanate on (001) cubic substrates", Integrated Ferroelectrics, 101, 4 (2009).
36. L. C. Zhang, A.L. Vasiliev, I. B. Misirlioglu, S. P. Alpay, M. Aindow, and R. Ramesh, "Cation ordering in epitaxial lead zirconate titanate films" Applied Physics Letters, 93, 262903 (2008).
37. K. Boldyreva, L. Pintilie, A. Lotnyk, I. B. Misirlioglu, M. Alexe, D. Hesse, "Ferroelectric/Antiferroelectric Pb(Zr<sub>0.8</sub>Ti<sub>0.2</sub>)O<sub>3</sub>/PbZrO<sub>3</sub> epitaxial multilayers: Growth and thickness-dependent properties", Ferroelectrics, 370, 140 (2008).
38. Report: 2008 Fiscal Year Annual Report of Office of Fossil Energy, U. S. Department of Energy: "III.A.7 Local Electronic Structure and Surface Chemistry of SOFC Cathodes - III.A SECA Research & Development / Cathode Development" by B. Yildiz and I. B. Misirlioglu.
39. I. B. Misirlioglu, L. Pintilie, K. Boldyreva, M. Alexe and D. Hesse, "Antiferroelectric hysteresis loops with two exchange constants using the two dimensional Ising model", Applied Physics Letters, 91, 202905 (2007).
40. K. Boldyreva, L. Pintilie, A. Lotynk, I. B. Misirlioglu, M. Alexe and D. Hesse, "Thickness driven antiferroelectric-to-ferroelectric phase transition of thin PbZrO<sub>3</sub> layers in PbZrO<sub>3</sub>/PbZr<sub>0.8</sub>Ti<sub>0.2</sub>O<sub>3</sub> multilayers", Applied Physics Letters, 91, 122915 (2007).
41. I. B. Misirlioglu, M. Alexe, L. Pintilie and D. Hesse, "Space charge contribution to the apparent enhancement of polarization in ferroelectric bilayers and multilayers", Applied Physics Letters, 91, 022911 (2007).
42. S. P. Alpay, I. B. Misirlioglu and V. Nagarajan, "Comment on "Simulation of interface dislocations effect on polarization distribution of ferroelectric thin films", Applied Physics Letters, 88, 092903 (2007).
43. G. Akcay, I. B. Misirlioglu and S. P. Alpay "Dielectric and pyroelectric properties of Barium Strontium Titanate films on orthorhombic substrates with (110)//(100) epitaxy", Journal of Applied Physics, 101, 104110 (2007).
44. I. B. Misirlioglu, G. Akcay, S. Zhong and S. P. Alpay, "Interface effects in ferroelectric bilayers and heterostructures", Journal of Applied Physics, (101), 036107 (2007).



45. G. Akcay, I. B. Misirlioglu, S. P. Alpay, "Response to comment on "Dielectric tunability of ferroelectric thin films on anisotropic substrates" [Appl. Phys. Lett. 90, 036101 (2007)] ", Applied Physics Letters, 90, 036102 (2006).
46. I. B. Misirlioglu, G. Akcay and S. P. Alpay, "Polarization variations due to different dislocation configurations in ferroelectric heterostructures", Integrated Ferroelectrics, 83, 67(2006).
47. G. Akcay, I. B. Misirlioglu, S. P. Alpay, "Dielectric tunability of ferroelectric thin films on anisotropic substrates", Applied Physics Letters, 89, 042903 (2006).
48. I. B. Misirlioglu and S. P. Alpay, Feizhou He and B. O. Wells, "Stress induced monoclinic phase in epitaxial BaTiO<sub>3</sub> on MgO", Journal of Applied Physics, 99, 104103 (2006).
49. I. B. Misirlioglu, M. Aindow, S. P. Alpay, and V. Nagarajan, "Thermodynamic and electrostatic analysis of threading dislocations in epitaxial ferroelectric films", Applied Physics Letters, 88, 102906 (2006).
50. I. B. Misirlioglu, A. L. Vasiliev, M. Aindow and S. P. Alpay, "Defect microstructures in epitaxial PbZr<sub>0.2</sub>Ti<sub>0.8</sub>O<sub>3</sub> films grown on (001)SrTiO<sub>3</sub> by pulsed laser deposition", Journal of Materials Science, 41, 697 (2006).
51. V. Nagarajan, C. L. Jia , H. Kohlstedt, R. Waser, I. B. Misirlioglu, S. P. Alpay and R. Ramesh, "Misfit dislocations in nanoscale ferroelectric heterostructures", Applied Physics Letters, 86, 192910 (2005).
52. I. B. Misirlioglu, A. L. Vasiliev, M. Aindow, S. P. Alpay, "Strong degradation of physical properties and formation of a dead layer in ferroelectric films due to interfacial dislocations", Integrated Ferroelectrics, 71, 67 (2005).
53. S. P. Alpay, I. B. Misirlioglu, V. Nagarajan, R. Ramesh, "Can interface dislocations degrade ferroelectric properties?", Applied Physics Letters, 85, 2044 (2004).
54. S. P. Alpay, I. B. Misirlioglu, A. Sharma, Z.-G. Ban, "Structural characteristics of ferroelectric phase transformations in single-domain epitaxial films", Journal of Applied Physics, 95, 8118 (2004).
55. I. B. Misirlioglu, A. L. Vasiliev, M. Aindow, S. P. Alpay, R. Ramesh, "Threading dislocation generation in epitaxial (Ba, Sr)TiO<sub>3</sub> films grown on (001) LaAlO<sub>3</sub> by pulsed laser deposition", Applied Physics Letters, 84, 1742 (2004).
56. J. V. Mantese, N. W. Schubring, A. L. Micheli, M. P. Thompson, R. Naik, G. W. Auner, I. B. Misirlioglu and S. P. Alpay, "Stress-induced polarization-graded ferroelectrics", Applied Physics Letters, 81, 1068 (2002).

*Publications in Conference Proceedings (Refereed)*

1. M. Janipour, I. B. Misirlioglu and K. Sendur, "Voltage Control of Surface Plasmon and Phonon Interactions in Doped Semiconductor-Dielectric Interfaces", in the proceedings of SPIE Meeting on Physics and Simulation of Optoelectronic Devices, San Francisco, USA, January 2017.
2. I. B. Misirlioglu and M. Yildiz, "Dielectric response of fully and partially depleted ferroelectric films", in the proceedings of IEEE, International Symposia for Applications of Ferroelectrics and Piezo Force Microscopy Meeting in Prague, Czech Republic, 2013.
3. I. B. Misirlioglu and M. Yildiz, "Stabilization and thickness dependence of depletion charge induced domains in ferroelectric nano capacitors", in the proceedings of IEEE, International Symposia for Applications of Ferroelectrics and Piezo Force Microscopy Meeting in Vancouver, Canada, 2011.

4. I. B. Misirlioglu, H. N. Cologlu and M. Yildiz, "Coupling of defect fields to domains and phase transition characteristics of ferroelectric thin films with charged defects", in the proceedings of Materials Research Society Fall 2010 Meeting, Boston, USA, 2010.
5. S. P. Alpay, Z.-G. Ban, I. B. Misirlioglu, and A. Sharma, "Effect of internal stresses on the phase transformation characteristics and physical properties of epitaxial ferroelectric films", in Proceedings of the 204th Electrochemical Society Meeting, Symposium on Epitaxial Growth of Functional Oxides.
6. I. B. Misirlioglu, A. L. Vasiliev, M. Aindow, R. Ramesh, and S. P. Alpay, "A Transmission Electron Microscopy study of dislocation substructures in PLD-grown epitaxial films of (Ba,Sr)TiO<sub>3</sub> on (001) LaAlO<sub>3</sub>", in Proceedings of 2003 MRS Fall Meeting, Symposium C, Ferroelectric Thin Films XII, Volume 784, Boston, USA, 2003.
7. J.V. Mantese, N. W. Schubring, A. L. Micheli, M. P. Thompson, R. Naik, G. W. Auner, I. B. Misirlioglu, Z.-G. Ban, and S. P. Alpay, "Hysteresis offset in stress induced polarization-graded ferroelectrics," in *Ferroelectric Thin Films XI*, edited by S. Aggarwal, S. Hoffmann, M. Shimizu, D. Y. Kaufman, and S. R. Gilbert, (Mater. Res. Soc. Symp. Proc. 748, Warrendale, PA, 2003), pp. U12.20.1.

## **Talks and Presentations** (\* Presenter when multiple authors present)

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E. M. Alkoy, I. B. Misirlioglu, "Electrocaloric effect in stress-free textured relaxor ferroelectric slabs", project introductory presentation at the Program Review Meeting of U. S. Air Force Office of Scientific Research May 14-19, 2018, Niceville, FL, USA.

M. Ertas\*, I. B. Misirlioglu and K. Sendur, "Investigation of the optical effect of stable VO<sub>2</sub> thin films for smart materials applications", oral talk in APS March Meeting, 2018, Los Angeles, CA, USA.

I. B. Misirlioglu\*, O. M. Moradi, C. Sen, A. Boni and L. Pintilie, "Polarization direction dependence of leakage currents: A new non-destructive route for read out of polarization in ferroelectric thin films?", 17-19 January 2018 at the ACERS Electronic and Advanced Materials Conference in Orlando, FL, USA.

I. B. Misirlioglu\*, O. M. Moradi, C. Sen, A. Boni and L. Pintilie, invited talk "Tailoring polarization direction dependence of leakage currents for non-destructive read out of polarization in ferroelectric thin films", 2-3 November 2017 at the ElektroseramikTR workshop in Gebze Technical University, İzmit, Turkey.

A. P. Levanyuk\*, S. Minyukov and I. B. Misirlioglu, invited talk "Loss of elastic stability and formation of inhomogeneous states at phase transitions in thin films on substrates", at the International Meeting on Ferroelectricity, September 4-8, 2017, in San Antonio, Texas, USA.

I. B. Misirlioglu, invited talk for weekly seminar, "Tailoring ferroelectricity in thin films for low-power and fast read-out memory applications", February 2017 at Koc University, İstanbul, Turkey.

O. M. Moradi\*, C. Sen, O. Akdogan and I. B. Misirlioglu, "Dependence of Impedance Characteristics of Ba,Sr,TiO<sub>3</sub> Ferroelectric Thin Films on Electrode Type", accepted for oral presentation at 2016 MRS Fall Meeting in Boston (could not be delivered due to visa problems of the presenting author).

I. B. Misirlioglu, O. M. Moradi\* and K. Sendur, "A new ferroelectric/semiconductor/tunnel-junction stack for non-destructive and low power read-out memory", accepted for oral presentation at 2016 MRS Fall Meeting in Boston (could not be delivered due to visa problems of the presenting author)...

I. B. Misirlioglu, “Dielectric-Semiconductor interfaces: What happens when you replace the dielectric with a ferroelectric?”, invited talk at Asian Meeting on Ferroelectricity 2016 Meeting, University of New Delhi, India (could not be delivered due to travel restriction following 15th of July 2016 coup attempt).

M. T. Kesim\*, I. B. Misirlioglu, J. V. Mantese and S. P. Alpay, “Manipulation of Carrier Density near Ferroelectric/Semiconductor Interfaces”, oral presentation at the American Physical Society 2016 March Meeting, Baltimore, MD, USA.

I. B. Misirlioglu, “Tailoring ferroelectricity for energy efficient field effect transistors: Domain driven mechanism”, invited talk at the American Ceramic Society Meeting on Electronic Materials and Applications 2016 Meeting, Orlando, FL, USA.

I. B. Misirlioglu, C. Sen\*, O. Moradi, M. T. Kesim and S. P. Alpay, “Polar phase stability in ferroelectric thin films and superlattices interfacing semiconductor heterojunctions in field effect transistors and tunnel junctions” oral presentation at 2015 MRS Fall Meeting in Boston, USA.

I. B. Misirlioglu\*, M. Yildiz and K. Sendur “Domain control of carrier density at a ferroelectric-semiconductor interface”, oral presentation at 57<sup>th</sup> Electronic Materials Conference of Materials Research Society, 24-26 June 2015, The Ohio State University, Ohio, USA.

I. B. Misirlioglu\*, M. Yildiz and K. Sendur “Ferroelectric thin films with semiconductor electrodes: Implications for polarization switching, dielectric properties and carrier density control via domains”, oral presentation at IEEE International Symposium on Applications of Ferroelectric (ISAF), International Symposium on Integrated Functionalities (ISIF), and Piezoresponse Force Microscopy Workshop, 24-27 May 2015, Singapore.

I. B. Misirlioglu, invited talk, “Interface controlled properties of ferroelectric thin films: Structural defects, carriers and phase transitions”, Department of Physics, Istanbul Technical University, Istanbul, Turkey, December 2014.

I. B. Misirlioglu, oral presentation, “Effect of the interface character on the stability of ferroelectricity in a semiconductor film”, Science & Applications of Thin Films Conference & Exhibition, Izmir Institute of Technology, Izmir, Turkey, September 2014.

I. B. Misirlioglu\*, A. P. Levanyuk, M. T. Kesim, S. P. Alpay, invited talk, “Ferroelectric-paraelectric superlattices for charge retention and solid state memories: Implications of theoretical results for device design.”, Electroceramics XIV Conference, June 2014 in Bucharest, Romania.

I. B. Misirlioglu, oral presentation, “Phase transitions and dielectric properties of ferroelectric thin films with misfit dislocations and impurities”, International Semiconductor Science & Technology Conference, January 2014, Istanbul, Turkey.

I. B. Misirlioglu, invited speaker, “Phase transitions and dielectric properties of ferroelectric thin films with competing surface and strain-relaxing defect effects”, Thermec 2013, Las Vegas, NV, USA.

A. P. Levanyuk\*, I. B. Misirlioglu, invited talk, “Phase transitions in paraelectric-ferroelectric superlattices: Limit of multidomain-single domain stability”, 4<sup>th</sup> International Conference from Nanoparticles and Nanomaterials to Nanodevices and Nanosystems, Corfu, Greece, June 2013.

I. B. Misirlioglu, invited speaker, “Defect and interface effects in ferroelectric thin films”, at the Single and Multiphase Ferroics in Reduced Dimensions (SIMUFER) COST action meeting, ISTEC, Faenza, Italy April 2013.

A. P. Levanyuk, I. B. Misirlioglu\*, “Dramatic effect of the near-electrode layer configurations on the phase transition characteristics of ferroelectric-paraelectric superstructures”, oral presentation at the American Physical Society March Meeting in Boston, 2012, USA.

I. B. Misirlioglu, invited speaker, “Defect and interfaces in ferroelectric thin films”, Department of Mechanical Engineering, Koç University, İstanbul, Turkey, December 2011.

I. B. Misirlioglu, invited speaker, “Defect and interfaces in ferroelectric thin films”, Department of Physics, Bilkent University, Ankara, Turkey, December 2011.

A. P. Levanyuk, I. B. Misirlioglu\*, “Dependence of phase transitions on boundary conditions at the oxide-electrode interfaces in ferroelectric-paraelectric superstructures”, European Meeting on Ferroelectricity, Bordeaux, 2011, France.

I. B. Misirlioglu, talk at the Turkish Academy of Sciences Meeting for Young Investigator awardees, “Dependence of phase transition characteristics of ferroelectric thin films on the interface boundary conditions”, Izmir, September 2011.

I. B. Misirlioglu, invited speaker, “Coupling of defect fields to domains and phase transition characteristics of ferroelectric thin films with charged defects”, International Workshop on Piezoelectric Materials and Applications in Actuators, 2010, Antalya, Turkey.

I. B. Misirlioglu, key speaker “Effect of Asymmetrical Interface Charges on the Hysteresis and Domain Configurations of Ferroelectric Thin Films”, International Symposia for Integrated Ferroelectrics, June 2010, San Juan, Puerto Rico, USA,

I. B. Misirlioglu, invited speaker “Defect and Interface Driven Alterations of Phase Transitions in Perovskite Type Ferroelectric Thin Films”, Romanian Conference on Advanced Materials, August 2009, Braşov, Romania.

I. B. Misirlioglu, V. Sharma, J. Fricano, B. Yildiz, at 42<sup>nd</sup> Western Regional Meeting 2008, American Chemical Society Materials for Renewable Energy Applications Las Vegas, Nevada, September 2008, “Reversible Solid Oxide Electrocatalytic Cells for Co-Generation of Hydrogen / Syn-Gas and Electricity”.

Several presentations at the Max Planck Institute of Microstructure Physics during meetings of the functional oxides group and Experimental Department 2.

I. B. Misirlioglu, “Interface driven degradation in  $\text{PbZr}_{1-x}\text{Ti}_x\text{O}_3$  superlattices” International Symposium on Integrated Ferroelectrics, poster session, Bordeaux, France 2007.

I. B. Misirlioglu, “Ferroelectric Heterostructures: Functional Components for New Generation Device Technologies”, invited talk at Sabanci University, Istanbul, Turkey, 2007.

I. B. Misirlioglu, “Ferroelectric Heterostructures: Functional Components for New Generation Device Technologies”, selected abstract for presentation at the Alexander von Humboldt Foundation Meeting, Bonn, Germany, 2007.

I. B. Misirlioglu\*, S. P. Alpay, A. Vasiliev, M. Aindow, “A Challenge Awaiting Nano-Scale Device Engineering: Suppression of Ferroelectricity in Ultrathin Epitaxial Ferroelectric Thin Films”, ASM Hartford Chapter Meeting, Storrs, CT, 2005.

I. B. Misirlioglu\*, S. P. Alpay, A. Vasiliev, M. Aindow, V. Nagarajan and R. Ramesh, “Influence of Dislocations on the Physical Properties of Ferroelectric Thin Films”, poster session in Materials Research Society Fall 2004 Meeting, Boston, MA, 2004.

I. B. Misirlioglu\*, S. P. Alpay, A. Vasiliev and M. Aindow "Role of Dislocations on the Physical Properties of Epitaxial Ferroelectric Thin Films", Connecticut Microelectronic and Optoelectronic Consortium, University of Connecticut, CT, 2004.

I. B. Misirlioglu\*, A. L. Vasiliev, M. Aindow R. Ramesh and S. P. Alpay, "A Transmission Electron Microscopy Study of Dislocation Substructures in PLD-grown Epitaxial Films of (Ba,Sr)TiO<sub>3</sub> on (001) LaAlO<sub>3</sub>", Materials Research Society Fall 2003 Meeting, Boston, MA, 2003.

I. B. Misirlioglu\*, N. Magdefrau, , A. Vasiliev, M. Aindow, S. P. Alpay, R. Ramesh, "Dislocation Structures in Epitaxial Barium Strontium Titanate Thin Films", American Ceramic Society, 105th Annual Meeting, Nashville, TN, 2003.

## Teaching

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*At Sabancı University:*

Materials Thermodynamics (Graduate Course, started in Fall of 2015)

Structure and Properties of Materials (Graduate course, every Fall, 2008-2014)

Introduction to Electron Microscopy (Graduate course, every Spring, 2009-2017)

Mechanical Properties of Materials (3<sup>rd</sup> year undergraduate course, Spring 2009-2011, 2015,2016)

Principles of X-ray diffraction characterization (5 week undergraduate lecture, 2008-2014)

Science of Nature (Freshman University course on physical chemistry, Spring 2013, 2014, 2017)

To be offered: Phase Transformations in Solids and Solid Solutions (Graduate course).

Materials Science and Nanotechnology (2016, 2017 Sabancı University Summer School for High School Students, requested by the President's Office for 2018 also)

*Before employment at Sabancı University:*

Helped Ph.D. students with the evaluation and interpretation of experimental data at the Max Planck Institute of Microstructure Physics.

Teaching assistant for 'Introduction to Materials Science and Engineering' in Spring 2005 at the University of Connecticut.

Extensively took part in demonstrations of advanced materials during Outreach Meetings of the Institute of Materials Science at the University of Connecticut between 2003 and 2006.

I volunteered to give talks on principles of ferroelectric, piezoelectric and superconductor materials to high school students and teachers in the summer of 2005 at the University of Connecticut.

Demonstrations of microanalysis and surface analysis at Istanbul Technical University in 2000 and 2001.

## Professional Memberships

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Alexander von Humboldt Network  
American Ceramic Society

## References

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**1.** S. Pamir Alpay,  
Professor and Dept. Head  
Department of Materials Science & Engineering,  
University of Connecticut. 97 North Eagleville Rd.  
Unit 3136, Storrs, CT 06269-3136 USA  
e-mail: p.alpay@ims.uconn.edu

**3.** Joseph V. Mantese,  
Senior Scientist  
United Technologies Research Center  
411 Silver Lane, East Hartford, CT 06108 USA  
e-mail: ManteseJV@utrc.utc.com

**5.** Marin Alexe  
Professor,  
Department of Physics, University of Warwick,  
Coventry, CV4 7AL, UK  
e-mail: M.Alexe@warwick.ac.uk

**2.** Dietrich Hesse,  
Professor  
Max Planck Institute of Microstructure  
Physics, Weinberg 2, Halle, 06120, Germany  
e-mail: hesse@mpi-halle.de

**4.** Lucian Pintilie,  
Professor, Director and Scientist  
National Institute of Materials Physics,  
P.O. Box MG-7, Bucharest-Magurele  
077125, Romania  
e-mail: pintilie@infim.ro