

Ivan Božović, PhD, FAPS, FSPiE, FSNAS

CURRICULUM VITAE

Brookhaven National Laboratory
MA 480
Upton NY 11947-9000

phone: (631) 344-4973
fax: (631) 344-4071

e-mail: bozovic@bnl.gov



Summary. Worked at university (9 years as a regular faculty and 4 as a visiting scientist), industrial research centers (13 years) and National Laboratory (10). Chaired a large university physics department (100 faculty and staff serving over 1000 students), was the CTO of a start-up company, and is currently a Group Leader at BNL. Published over 200 refereed research papers, edited 10 monographs, and presented over 250 invited conference talks and colloquia. Chaired 20 international conferences or symposia.

RESEARCH INTERESTS

(1) Basic physics of condensed states of matter; (2) novel electronic properties including unconventional metallic conductivity, superconductivity and colossal magneto-resistance, (3) innovative methods of thin film synthesis and characterization; (4) mesoscopic (nano-scale) physics.

RESEARCH EXPERIENCE

Experimental techniques: ultra-high vacuum; cryogenics; thin film synthesis (by molecular beam epitaxy, laser ablation, electron-beam evaporation and sputtering); X-ray diffraction; optical spectroscopy (far-IR to UV, Raman, spectro-ellipsometry); ion scattering spectroscopy; transport measurements; device design and testing. Theory: group theory, electron band structure, optical spectra, phonon spectra, vibronic coupling; numerical simulations of RHEED and XRD patterns and surface structure; cohesion and structure of ionic crystals. Materials studied so far: conducting polymers (polyacetylene, poly-p-phenylene, polypyrrole); carbon nanotubes; cuprates, bismuthates, titanates, manganites, cobaltates, nickelates, tungstates, vanadates and ruthenates.

DISTINCTION

AWARDS AND HONORS

2013	Max Planck Lecture and gold medal from Max Planck Institutes, Stuttgart, Germany
2012	Berndt T. Matthias Prize for Materials Aspects of Superconductivity (shared with J. Eckstein and D. Johrendt)
2011	Named as "New York State Leader in Superconductivity" by NYS Superconductor Technology Summit
2011	"Dr. Ivan Bozovic Award" for best paper in the area of superconductivity area established by <i>Physics Express</i> journal
2009	<i>Foreign (Honorary) Member</i> , Serbian Academy of Sciences and Arts
2008	BNL Science and Technology Award

- 2004 SPIE Technology Achievement Award
- 1999 M. Jaric Memorial Prize (*The first recipient*)
- 1998 *Fellow*, The American Physical Society
- 1997 *Fellow*, The International Society for Optical Engineering
- 1989 Polaroid International Prize for Microphotography (shared with D. Schlom, J. Harris, and J. Eckstein)
- 1985 Institute of Physics (Belgrade) Prize
- 1982 Fulbright Fellowship

CONFERENCE CHAIRING

- 2013 Co-chair, Solid state physics Workshop (SSP13), Beograd, Serbia
- 2013 Co-chair, Search for New Superconductors Focus Topic, APS March Meeting
- 2011 Chair, SFKM11, Beograd, Serbia
- 2009 Co-chair, Conference on Complex Oxide Heterostructures, St. Thomas, US Virgin Islands.
- 2009 Symposium Chair, The Materials Research Society Symposium on Novel Functional Properties at Oxide-Oxide Interfaces, San Francisco, California.
- 2007 Chair, HTS Thin Films Workshop, Tsukuba, Japan.
- 2006 Chair, *Materials Panel*, DOE BES Workshop on Basic Research Needs for Superconductivity, Arlington, Virginia
- 2005 Conference Chair, International Society for Optical Engineering (SPIE) Conference on Strongly Correlated Electron Materials: Physics and Nanoengineering, San Diego, California.
- 2004 Symposium co-chair, 11th Int. Conf. on Composites/Nano-engineering (ICCE-11) Hilton Head, S. Carolina
- 2003 Contact co-chair, IUMRS-ICAM2003 (Fabrication of Oxide Thin Films and Compo-sites), Yokohama, Japan
- 2002 Conference Chair, SPIE Conference on *Superconducting and Related Oxides: Physics and Nanoengineering V*, Seattle, Washington.
- 2000 Conference Chair, SPIE Conference on *Superconducting and Related Oxides: Physics and Nano-engineering IV*, Orlando, Florida.
- 1998 Conference Chair, SPIE Conference on *Superconducting Superlattices II: Natural and Artificial*, San Diego, California.
- 1998 Conference Chair, SPIE Conference on *Oxide Superconductor Physics and Applications III*, San Diego, California.
- 1997 Symposium Chair, Mini-symposium on Novel Materials, 3rd European Conference on Applied Superconductivity, Koningshof, Holland.
- 1996 Symposium Chair, The Materials Research Society Symposium on High-Temperature Superconductors, Boston, Massachusetts.
- 1996 Conference Chair, SPIE Conference on *Spectroscopic Studies of Superconductors*, San Jose, California.
- 1996 Conference Chair, SPIE Conference on Oxide Superconductor Physics and Applications II, San Jose, California.
- 1994 Conference Chair, SPIE Conference on *Superconducting Superlattices and Multilayers*, Los Angeles, California.
- 1994 Conference Co-chair, SPIE Conference on *Oxide Superconductor Physics and Applications*, Los Angeles, California.

ADVISORY BOARDS

Journal and institution boards

- 2011- Editorial Board, *ISRN Condensed Matter Physics*.
- 2010- Editorial Board, *Journal of Nanoscience Letters*.
- 1998- Editorial Board, *The International Journal of Superconductivity*.
- 2006 Guest Editor, *J. Superconductivity*, special issue honoring V. L. Ginzburg.
- 2006 Co-editor, *Proceedings of Applied Superconductivity Conference*
- 2012- International Advisory Board, Center of Excellence for Superconductivity Research (CESUR), Ankara, Turkey
- 2012- Advisory Committee, MBE group, Institute of Physics, Academia Sinica, Taipei, Taiwan

- 2005- International Advisory Committee, Institute for Complex Matter, Federal Institute of Technology, Lausanne, Switzerland.
- 2005- International Advisory Board, Yugoslav Materials Research Society.

Conferences

- 59. International Advisory Board, Oxide Thin Films, Nanocomposites and Heterostructures, IUMRS-ICEM-14 Taipei, Taiwan, 2014.
- 58. International Advisory Board, EMN (Energy, Materials, Nanotechnology) Conference, Cancun, Mexico, 2014
- 57. International Advisory Board, 4th International Conference *Fundamental Problems of HTS*, Zvenigorod, Russia, 2014.
- 56. International Advisory Board, 7th International Conference *From Solid State to Biophysics*, Dubrovnik, Croatia, 2014.
- 55. International Advisory Board, 15th Annual Conference of the Yugoslav Materials Research Society, Herceg Novi, Montenegro, 2014.
- 54. International Advisory Board, 4th International Conference on Superconductivity and Magnetism (ICSM2014), Istanbul, Turkey, 2014.
- 53. International Advisory Board, 7th International Conference "Science and Engineering of Novel Superconductors", Montecatini Terme, Tuscany, Italy, June 2014.
- 52. International Advisory Board, Oxide-based Materials and Devices V, SPIE International Symposium SPIE OPTO, San Francisco, CA, 2014.
- 51. International Advisory Board, V Euro-Asian Symposium "Trends in Magnetism: Nano-magnetism" EASTMAG-2013, Vladivostok, Russia, 2013.
- 50. International Advisory Board, EMN (Energy, Materials, Nanotechnology) Conference, Houston, TX, 2013.
- 49. International Program Committee, Oxide-based Materials and Devices IV (OE109), San Francisco, CA, 2013.
- 48. International Advisory Board, 14th Annual Conference of the Yugoslav Materials Research Society, Herceg Novi, Montenegro, 2013.
- 47. International Advisory Board, Conference on Electronic States and Phases Induced by Electric or Optical Impacts (IMPACT 2012), Paris, France, 2012.
- 46. International Advisory Board, 9th International Conference on New Theories, Discoveries, and Applications of Superconductors and Related Materials (New3SC-9), Frascati, Italy, 2012.
- 45. International Advisory Committee, the International Conference on the Materials and Mechanisms of Superconductivity (M²S 2012), Washington, DC, 2012.
- 44. International Advisory Board, The International Ginzburg Conference on Physics, Moscow, Russia, 2012.
- 43. International Advisory Board, Energy Materials Nanotechnology (EMN) Meeting, Orlando FL, US, 2012.
- 42. International Advisory Board, 6th International Conference *From Solid State to Biophysics*, Dubrovnik, Croatia, 2012.
- 41. International Advisory Board, 3rd International Conference on Superconductivity and Magnetism (ICSM2012), Istanbul, Turkey, 2012.
- 40. International Program Committee, Oxide-based Materials and Devices III, SPIE Photonics West, San Francisco CA, USA, 2012.
- 39. International Advisory Board, 13th Annual Conference of the Yugoslav Materials Research Society, Herceg Novi, Montenegro, 2012.
- 38. *Chair*, The International Advisory Board, 8th International Conference on New Theories, Discoveries, and Applications of Superconductors and Related Materials (New3SC-8), Chongking, China, 2011.
- 37. International Advisory Board, Villa Conference on Complex Oxide Heterostructures, Las Vegas, Nevada, US, 2011.
- 36. International Advisory Committee, Oxide Nanocomposites Symposium, ICCE-18 (18th International Conference on Composites and Nano-engineering), Shanghai, China, 2011.
- 35. International Advisory Board, 12th Annual Conference of the Yugoslav Materials Research Society, Herceg Novi, Montenegro, 2011.
- 34. *Chair*, The International Advisory Committee, International Conference on Complex Oxide Heterostructures, Santorini, Greece, 2010.
- 33. International Advisory Board, 5th International Conference *From Solid State to Biophysics*, Dubrovnik, Croatia, 2010.

32. International Advisory Board, the Twelfth Annual Conference YUCOMAT 2010, Herceg Novi, Montenegro, 2010.
31. *Chair*, The International Advisory Committee, International Conference on Complex Oxide Heterostructures, St. Thomas, US Virgin Islands, 2009.
30. International Advisory Board, 7th International Conference on New Theories, Discoveries, and Applications of Superconductors and Related Materials (New3SC-7), Beijing, China, 2009.
29. International Advisory Board, 11th Annual Conference of the Yugoslav Materials Research Society, Herceg Novi, Montenegro, 2009.
28. International Advisory Board, 6th International Conference on Stripes and High- T_c Superconductivity, Erice, Sicily, Italy, 2008.
27. International Advisory Board, 10th Annual Conference of the Yugoslav Materials Research Society, Herceg Novi, Montenegro, 2008.
26. International Advisory Committee, Oxide Nanocomposites Symposium, ICCE-16 (16th International Conference on Composites and Nano-engineering), Kunming, China, 2008.
25. International Advisory Board, 4th International Conference *From Solid State to Biophysics*, Dubrovnik, Croatia, 2008.
24. International Advisory Board, The 8th International Conference on Spectroscopies in Novel Superconductors (SNS2007), Sendai, Japan, 2007.
23. International Advisory Board, XVII Symposium on Condensed Matter Physics, Vrsac, Serbia, 2007.
22. International Advisory Board, Ninth Annual Conference of the Yugoslav Materials Research Society, Herceg Novi, Montenegro, 2007.
21. International Advisory Board, DELFS Conference, Port Jefferson, NY USA, 2007.
20. International Advisory Board, 6th International Conference on New Theories, Discoveries, and Applications of Superconductors and Related Materials (New3SC-6), Sydney, Australia, 2007.
19. International Advisory Board, Eight Annual Conference of the Yugoslav Materials Research Society, 2006.
18. International Advisory Board, 3rd International Conference *From Solid State to Biophysics*, Dubrovnik, Croatia, 2006.
17. International Advisory Committee, Oxide Nanocomposites Symposium, ICCE-14 (14th International Conference on Composites and Nano-engineering), Boulder, Colorado, 2006.
16. International Advisory Board, Seventh Annual Conference of the Yugoslav Materials Research Society, 2005.
15. Program Committee, Oxide Nanocomposites Symposium, Tenerife, Spain, 2005.
14. Program Committee, Applied Superconductivity Conference, Jacksonville, Florida, 2004.
13. International Advisory Board, 7th International Conference on Spectroscopies in Novel Superconductors (SNS2004) Sitges, Spain, 2004.
12. International Advisory Board, 2nd International Conference *From Solid State to Biophysics*, Dubrovnik, Croatia, 2004.
11. International Advisory Board, 5th International Conference on New Theories, Discoveries, and Applications of Superconductors and Related Materials (New3SC-4), Chongqing, China, 2004.
10. International Advisory Board, NATO Advanced Research Workshop on New Challenges in Superconductivity, Coral Gables, Florida, 2004.
9. International Advisory Board, 4th International Conference on New Theories, Discoveries, and Applications of Superconductors and Related Materials (New3SC-4), San Diego, California, 2003.
8. International Advisory Board, International Conference *From Solid State to Biophysics*, Dubrovnik, Croatia, 2002.
7. International Advisory Board, 3rd International Conference on New Theories, Discoveries, and Applications of Superconductors and Related Materials (New3SC-3), Honolulu, Hawaii, 2001.
6. International Advisory Board, 3rd International Conference on Stripes and High- T_c Superconductivity, Rome, Italy, 2000.
5. Advisory Board, 2nd International Conference on New Theories, Discoveries, and Applications of Superconductors and Related Materials (New3SC-2), Las Vegas, Nevada, 1999.
4. Advisory Board, International Symposium on Irradiation Induced Phenomena in Organic Thin Films, Sophia, Bulgaria, 1999.
3. International Advisory Board, Symposium on Condensed Matter Physics, Kladovo, Yugoslavia, 1997.
2. International Advisory Board, The Fifth World Congress on Superconductivity, Budapest, Hungary, 1995.
1. International Advisory Board, The 2nd International Symposium on High- T_c Superconductivity and Tunneling Phenomena, Slavyanogorsk, Ukraine, 1994.

VISITING POSITIONS

2007	<i>Visiting Professor</i> , EPFL, Lausanne, Switzerland
2003	<i>Visiting Professor</i> , ESPCI (Ecole Supérieure de Physique et Chimie Industrielle) Paris, France
2003	<i>Visiting Scientist</i> , Los Alamos National Laboratory
2002-3	<i>Visiting Scientist</i> , Laboratory for Advanced Materials, Stanford University
2002	<i>Visiting Scholar</i> , Applied Physics Department, Yale University.
1987-88	<i>Visiting Professor</i> , Applied Physics Department, Stanford University.
1985-86	<i>Visiting Scholar</i> , Department of Physics, University of Pennsylvania, Philadelphia.
1982, 85	<i>Visiting Professor</i> , University Notre-Dame, Namur (Belgium).
1982-83	<i>Visiting Scholar</i> , Physics Department, University of California, Berkeley.

EMPLOYMENT HISTORY AND ACHIEVEMENTS

2003- Brookhaven National Laboratory, **Group Leader and Senior Scientist**

Established a new group at BNL for Molecular Beam Epitaxy (MBE) of complex oxides. Designed and built a set of 7 laboratories and assembled a world-class team. The laboratory is fully functional at the peak performance, producing daily the highest-quality HTS films, heterostructures and superlattices, patterning them into a range of devices, and studying their physical properties. Apart from in-house experiments, the MBE group provides unique samples to few dozen collaborating groups - at BNL, other national laboratories (ANL, LANL, LBL, NIMH, ORNL), leading US universities (Harvard, MIT, Stanford, Caltech, Urbana, Cornell, Johns Hopkins, Houston, etc.) and numerous other groups in Canada, Europe and Asia.

Principal achievements:

- Combinatorial study of doping (in)dependence of interface superconductivity, covering over 800 compositions, and showing that underdoped HTS cuprates do not behave as Fermi liquids. [The paper #241 in the List of Publications]
 - Field effect in HTS, study of S-I quantum phase transition: established existence of local pairs in cuprates. [the paper #212 in the List of Publications]
 - Delta-doping in complex oxide hetero-structures; the proof that HTS occurs in a single CuO_2 plane. [204]
 - Discovery of high- T_c interface superconductivity. [197 and patent]
 - Discovery of photo-induced colossal expansion in La_2CuO_4 (in collaboration with Nobel Laureate A. Zewail at Caltech) [186]; proof of strong electron-lattice coupling in cuprates. [194]
 - Experimental proof of the "Giant Proximity Effect". [174, 216]
 - Discovery of coherent excitation of longitudinal acoustic phonons by light. [167, 168, 175]
 - Synthesis of novel artificial (metastable) compounds such as $\text{Ba}_2\text{LaBi}_3\text{O}_9$.
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1998-2002 Oxxel GmbH, Bremen, Germany, **Chief Technical Officer and Principal Scientist**

Designed and built a unique, next-generation oxide-MBE system, with many innovations: modularity, combinatorial search capability, integration of MBE with state-of-the-art *in-situ*, real-time surface science tools (TOF-ISARS, LEEM). Integrated the system, automated it completely (with 1,000 protective interlocks), and computerized all the controls. Starting from an empty hall, within one year put together a completely self-sufficient laboratory for device fabrication and testing that included electron-beam nano-lithography, AFM/STM nano-microscopy, high-resolution XRD, ultra-high-frequency microwaves, low-noise low-temperature transport measurements, etc., with a complex supporting infrastructure. Assembled and led a world-class team of scientists which promptly assumed the leading position in the field.

Principal achievements:

- LCO and LSCO films of unmatched quality, with rms surface roughness of 0.2 nm. [166]
- $T_c = 51.5$ K (the highest ever observed) in LSCO bilayer film. [166]

- $T_c = 40$ K in LCO film on SrTiO_3 - under *tensile* stress. [166] (This result shattered widespread misconceptions about the effect of epitaxial stress on HTS.)
- Heterostructures with one-unit-cell thick LCO barriers without pinholes. [173]
- Josephson Junctions (JJs) with HTS interconnects in arbitrary circuit topology; SQUIDs and arrays with up to 2,600 JJs. [This was never achieved before with this type of JJs.]
- Experimental proof that HTS and antiferromagnetism separate on a scale of 1 Å. [173]
- Discovered *colossal expansion* (>2%) in ultrathin LCO films on STO upon exposure to ozone. [166, 176]
- The first direct structural probe of the spatial homogeneity of the HTS condensate [165]

1989-1998 Varian Research Center, Palo Alto, CA: **Senior Research Scientist**

Synthesized and characterized thin films, multilayers and heterostructures using atomic layer-by-layer molecular beam epitaxy. The compounds included cuprate superconductors, manganites that show colossal magneto-resistance, and titanate ferroelectrics. Synthesized large-area superconducting and ferroelectric thin films by pulsed laser ablation, and metal films by electron-beam evaporation. Conducted experimental and theoretical studies of transmittance, reflectance, ellipsometric, and Raman spectra of thin films and single crystals of cuprates and other metallic oxides.

Principal achievements:

- In-situ synthesis of untwinned single-crystal thin films of various BiSrCaCuO phases, with record transport properties, atomically flat surfaces, and no secondary-phase defects. [66, 67]
- One-unit-cell thick BiSrCaCuO films and dilute superconducting superlattices, with T_c equal to that of bulk samples. [82, 108] (This provided the first direct evidence for quasi-two-dimensional nature of the HTS state.)
- A novel family, $\text{BiSr}_2\text{Ca}_{n-1}\text{Cu}_n\text{O}_{2n+2}$, of metastable superconducting compounds. (The first demonstration of material engineering at atomic-monolayer level in complex oxides.) [92]
- Trilayer structures that provided the first hysteretic high- T_c Josephson Junction devices, and demonstration of barrier engineering (via chemical doping) over four orders of magnitude in I_c and R_n . [84, 85, 112], with $I_c R_n = 10$ mV — order-of-magnitude better than in any other junction reported before. [95, 96] (The first demonstration of modulation doping in complex oxides.)
- The first HTS tunnel (SIS) Josephson junctions, with sharp quasiparticle gap features. [106, 148]
- Single-crystal thin films of $(\text{La,Sr})\text{MnO}_3$ and $(\text{La,Ca})\text{MnO}_3$ that show colossal magneto-resistance (CMR). [138, 140, 144]
- Heterostructures involving various phases of $(\text{La,Sr})\text{MnO}_3$ and $(\text{La,Ca})\text{MnO}_3$, including the first lateral superlattices. (The first nanowires fabricated using oxides.) These superlattices showed 5-fold increase in low-field sensitivity. [138]
- Spectroscopic evidence for similarity of electronic excitations in cuprates and other metallic oxides [113]. Developed a model which quantitatively describes these spectra and predicts existence of novel low-energy excitations [96].

1986-8 Applied Physics Department, Stanford University: **Visiting Scholar** (1986) **Senior Research Associate** (1987), **Visiting Professor** (1988)

- Conducted extensive experimental and theoretical studies of transmittance, reflectance, ellipsometric, and Raman spectra of thin films and single crystals of cuprates.
- Studied photoresponse of cuprates to femtosecond free-electron laser radiation.

Principal achievements:

- Invented a novel, accurate method of determining the spectral function of metals, by combining reflectance and spectro-ellipsometry. [63] (The method has been adopted subsequently by several leading research institutions, including University of Illinois at Urbana-Champaign and Naval Research Laboratory.)
- Reported the first transmittance spectra of HTS thin films, discovered the electronic Raman continuum in cuprates [42].

- Reported the first polarized reflectance spectra of HTS single crystals [46, 68] which provided an early proof of quasi-2D nature of HTS in cuprates.
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1984-86 Institute of Physics, Belgrade, Yugoslavia: **Senior Research Scientist**,

1975-84 Faculty of Science, University of Belgrade, Yugoslavia: **Lecturer** (1975-8) **Docent** (1978-83),
Head, Department of Physics (1979-81)

Investigated structure, symmetry, electron and vibration spectra, instabilities, transport properties and photo-response of conducting polymers and quasi-one-dimensional metals. Studied behavior of metals at ultra-high pressures.

PUBLICATIONS AND PATENTS

Published 11 research monographs and over 200 research papers, including 16 in *Science* and *Nature* journals. These results were cited over 5,000 times ($h = 40$) and highlighted by editorials in *Physics Today*, *Scientific American*, *The APS News in Physics*, *Science*, *Nature* journals, *Physics World*, *MRS Bulletin*, *Materials Today*, *Superconductor Week*, *Superconductivity News*, DOE Office of Science publications, *Innovations*, *Washington Post*, *Reuters*, and hundreds of web journals worldwide. Awarded six patents.

PROFESSIONAL SERVICE

Gave over 250 invited talks, keynote and plenary addresses, colloquia, seminars, etc. Served on numerous panels and committees; (co)chaired 20 conferences or symposia. Refereed papers for *Nature*, *Nature Physics*, *Nature Materials*, *Nature Nanotechnology*, *Nature Communications*, *Science*, *Physical Review Letters*, *Physical Review*, and other leading journals. Reviewed project proposals for the US National Science Foundation (9), US Department of Energy (14), US National Science Foundation (4); the International Science Foundation (9), the Foundation for Fundamental Research on Matter of the Netherlands (5), Swiss National Science Foundation (2), Italian Foundation for Research (2), U.S.-Israel Binational Science Foundation (1), Natural Sciences and Engineering Research Council of Canada - NSERC (3), Engineering and Physical Sciences Research Council of United Kingdom (2), CNRS - France (1), European Union Research Foundation (3) and German-Israeli Foundation for Scientific Research and Development (1). Served on Advisory board for Materials synthesis program at Gordon and Betty Moore Foundation. Served internationally on prize awards, faculty election, and Ph.D. thesis committees.

EDUCATION

Doctor of Physical Sciences (1975), M.Sc. in Physics (1972); B.Sc. in Physics (1970; valedictorian), University of Belgrade, Yugoslavia.

PERSONAL

Born in Belgrade, Yugoslavia; US citizen. Married to Natasha Bozovic, Professor of Mathematics at California State University. Have two daughters, Dolores (US Presidential Scholar, Stanford B.Sc, Harvard Ph.D., Associate Professor at UCLA Physics Dept, Laureate of DeGennes Prize for Biophysics) and Marijeta (Harvard B.A., Columbia Univ. PhD, Fulbright Fellow, Assistant Professor at Yale University).