

Nacer Badi, Ph.D.

Citizenship: U.S.A

University of Houston
Department of Physics
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SUMMARY OF QUALIFICATIONS

- More than 20 years of expertise in thin film coating, characterization, and device fabrication.
 - More than 15 years of experience in R&D related to energy storage capacitor/battery technologies.
 - Expertise in nitride and oxide based materials for hybrid microelectronics and optoelectronics.
 - Expertise in high/low temperature material structures and devices.
 - Expertise in cold cathode technology and high power electronics.
 - Expertise in generation of nanoparticles in gases and liquids.
 - Expertise in synthesis of core-shell nanoparticles using both laser ablation and wet chemistry processes for nanostructured energy storage applications.
 - Strong theoretical background in solid state physics along with modeling and simulation capabilities using multi-physics software tools.
 - Managed and led successfully multiple projects (Department of Energy (DOE), Department of Defense (DOD), National Science Foundation (NSF), National Aeronautics and Space Administration (NASA),...)
 - Experience and knowledge in startups business companies, technology patenting, transfer, and commercialization.
 - Solid skills in problem solving and innovation.
 - Self-directed and motivated with capability to consistently achieve objectives.
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PROFESSIONAL EXPERIENCE:

Visiting Professor (May 2015 – Present), University of Tabuk, KSA

Research Associate Professor (March 2010 – Present),

Physics Department – University of Houston, Houston, TX 77204, USA

Lead, Nanoelectronics and Nanoenergetics Group (March 2010 – Present)

Center for Advanced Materials; University of Houston, Houston, TX 77204, USA

- Development of artificial nanodielectrics for supercapacitors applications
- Development of carbon nanostructures based electrodes for electrochemical capacitors and batteries.
- Development of energetic materials built at the nanoscale and creation of test procedures to evaluate the ignition performance. These are core-shell nanoparticles and nanowires and which have potential applications as propellants and explosives.
- Development of nanotubes, nanowires and nanopillars electrodes for advanced energy generation, storage, and conversion devices.

Research Associate Professor (Feb.2007 – 2014)

Center for Advanced Materials; University of Houston, Houston, TX 77204, USA

- Development of core-shell nanoparticles using both dry and wet chemistries of ceramics and metals in liquids for nanostructured energy storage applications
- Acquired and setup commercial COMSOL software modules for Structural Mechanics, Heat Transfer, RF, Chemical Engineering, and MEMS multiphysics simulations.

Research Assistant Professor (Feb.2002 – 2007)

Center for Advanced Materials; University of Houston, Houston, TX 77204, USA

- Working on the development of cold cathode technology;
- Serving as a PI on field emission –based pressure micro sensors project sponsored by NSF;

The experimental capability and expertise in field emission measurements has become a University wide resource for systematic characterization of a variety of thin film and bulk materials (nanotubes, DLC, superconductor alloys, oxide ceramics, etc..).

Research Scientist (May. 1999- Feb.2002)

Texas Center for Superconductivity and Advance Materials;
University of Houston, Houston, TX 77204, USA

- Developed nitride -based materials for electron field emitters, high power high temperature devices, and tribological applications.
- Design of a UHV growth chamber tailored to nitride growth for high growth rate and large area wafers.

Research Associate (Feb. 1997- Apr. 1999);

Space Vacuum Epitaxy Center; University of Houston, Houston, TX 77204, USA

- Developed PVD growth and characterization of nitride related materials and device fabrication.
- Investigated materials science of nitride thin film growth, characterization, simulation/modeling, and device fabrication.

Exchange Visiting Scientist (Sep. 1994- Jan. 1997)

Space Vacuum Epitaxy Center; University of Houston, Houston, TX 77204, USA

- Initiated modeling and simulation of fundamental processes in nitride growth.
- Upgrading, trouble shooting and maintenance of process equipment.

Assistant Professor (lecturer - Sep. 1992- Jun. 1994)

Department of Electrical Engineering
University of Sidi Bel-Abbes, 22000, Sidi Bel-Abbes, Algeria

Teaching Assistant (Sep. 1989- Jun.1992)

Faculty of Sciences
Department of Physics & Mathematics
University of Sidi Bel-Abbes, 22000, Sidi Bel-Abbes, Algeria

FUNDED GRANT PROPOSAL ACTIVITIES (AS PRINCIPAL INVESTIGATOR)

- 2001 – 2004 National Science Foundation/ECS: Nitride –based Cold Cathodes for Microdevice Applications, Award Number: IIP-0839347, Total: **\$209,962**
- 2001 – 2002 US Department of Defense/ Ballistic Missile Defense Organization /SBIR Phase 1: Development of Boron Nitride Capacitors for High-Energy Density High Temperature Applications, Contract Number: N00174-01-C-0032, Total: **\$64,000**
- 2003 – 2005 US Department of Defense/ Missile Defense Agency /SBIR Phase 2: Development of Boron Nitride Capacitors for High-Energy Density High Temperature Applications, Contract Number: N00178-03-C-1007, Total: **\$698,159**
- 2005 – 2006 US Department of Energy /SBIR Phase 1: Boron Nitride Capacitors for Advanced Power Electronic Devices, Award Number: DE-FG02-05ER84325, Total: **\$100,000**
- 2006 – 2009 US Department of Energy /SBIR Phase 2: Boron Nitride Capacitors for Advanced Power Electronic Devices, Award Number: DE-FG02-05ER84325, Total: **\$749,805**
- 2006 – 2007 Rohm Corporation: Boron Nitride Capacitors: Feasibility Study (Phase I) – **\$66,000**
- 2008 – 2009 National Science Foundation/SBIR Phase 1: Metamaterials for Giant Dielectrics and Energy Storage Solutions, Award Number: IIP-0839347, Total: **\$100,000**
- 2011 – 2012 Integrated Micro Sensors, Inc. Design, Simulation, and Synthesis of Metallic and Dielectric Nanoparticles for Photon Conversion Applications, Total: **\$24,000**
- 2010 – 2012 National Science Foundation/SBIR Phase 2: Metamaterials for Giant Dielectrics and Energy Storage Solutions, Award Number: IIP-0839347, Total: **\$480,395**
- 2012 – 2013 Texas State Fund: Nanomaterials for Energy Storage Solutions, Total: **\$65,000**
- 2014 – 2015 University of Tabuk, Synthesis and Characterization of Graphene Coatings Towards Realization of Single Source Optical Detectors, Total: **SAR49,000**

FUNDED GRANT PROPOSAL ACTIVITIES (AS CO-INVESTIGATOR)

- 2002 – 2003 DOD / USAF: Calibration Source Based on Micro-Column Arrays, Award Number: F40600-02-C-0011, Total: **\$100,000.**
- 2002 – 2003 HHS: Innovative Manufacturing Processes, Award Number: DASG6003P0158, Total: **\$70,000.**
- 2002 – 2003 DOD / USAF: Instrumentation for Ultrafine Particles Characterization, Award Number: 1R43ES012513-01, Total: **\$100,000.**
- 2003 – 2004 DOD / USAF: Solid -State High Temperature Jet Engine Fire Detector, Award Number: FA8103-04-C-0136, Total: **\$100,000.**
- 2003 – 2004 NASA: Improved High Efficiency MCPs for Detection of Photons and Large Biomolecules, Award Number: NNG04CA73C, Total: **\$70,000.**
- 2003 – 2004 DOD / USAF: Solid -State High Temperature Jet Engine Fire Detector, Award Number: FA8103-05-C-0208, Total: **\$750,000.**
- 2005 – 2006 DOD / MDA: Ultra-Strong High-Temperature Bonding of Titanium to Ceramic Materials, Award Number: HQ0006-06-C-7431, Total: **\$100,000.**
- 2005 – 2006 NSF: Integrated Broad Band Optical Calibration Sources for Star Simulation, Award Number: 0538759, Total: **\$100,000.**

- 2006 – 2007 Phase I DOD / OSD: High Efficiency InGaN Solar Cells, Award Number: FA9453-07-M-0138, Total: **\$99,675.**
- 2006 – 2007 DOD / MDA: Ultra-Strong High-Temperature Bonding of Titanium to Ceramic Materials, Award Number: W9113M-07-C-0168, Total: **\$749,999.**
- 2007 – 2009 Phase II DOD / OSD: High Efficiency InGaN Solar Cells, Award Number: FA9453-08-C-0111, Total: **\$749,998.**
- 2008 – 2009 NASA: InGaN High Temperature Photovoltaic Cells, Award Number: NNX09CD08P, Total: **\$99,956.**
- 2008 – 2009 DOD/DARPA: High Bandgap InGaN Solar Cell, Award Number: W31P4Q-09-C-0168, Total: **\$98,956.**
- 2008 – 2009 DOE: Photo-Enhanced Hardened Flat Cold Cathodes Based on III Nitrides for Pulsed and Ultra-Fast Electron Sources, Award Number: DE-FG02-09ER85583, Total: **\$100,000.**
- 2008 – 2009 NASA: InGaN High Temperature Photovoltaic Cells, Award Number: NNX10CA41C, Total: **\$599,986.**
- 2009 – 2010 Phase I NASA: Drastic Improvements in Bonding of Fiber Reinforced Multifunctional Composites, Award Number: NNX10CF33P, Total: **\$100,000.**
- 2009 – 2010 DOD / USAF: Integrated Broad Band Optical Calibration Sources for Star Simulation, Award Number: FA9101-10-M-0011, Total: **\$100,000.**
- 2010 – 2012 Phase II NASA: Drastic Improvements in Bonding of Fiber Reinforced Multifunctional Composites, Award Number: NNX11CB89C, Total: **\$600,000.**
- 2010 – 2011 NASA: Miniature Intelligent Wireless Fire Detector System, Award Number: NNX11CE45P, Total: **\$100,000**

PENDING GRANT PROPOSAL ACTIVITIES (AS PRINCIPAL INVESTIGATOR)

- 2014 – 2015 KACST, Nano-engineered carbon-silicon composites for scalable and high performance solid state Li-ion rechargeable batteries, 15-NAN3507-48, Total: **SAR1,727,643**
- 2014 – 2015 KACST, Core-shell polymer nanodielectrics with colossal permittivity for scalable energy storage solutions, 15-NAN5048-48, Total: **SAR1,530,630**

PATENTS:

1. “Capacitor and method of storing energy”
N. Badi and A. Bensaoula, US **6,570,753** Published: May 27, 2003
2. “Capacitor and method of storing energy” N. Badi and A. Bensaoula
US **6,939,775** Published: Sep 6, 2005.
3. “Boron nitride for anti-reflection coating of photovoltaic devices”
N. Badi, A. Freundlich, A. Bensaoula, and A. Alemu, US **8716595 B2** Published: May 6, 2014.
4. “High temperature boron oxynitride capacitor”
N. Badi and A. Bensaoula, US **2010/0157509 A1** published: June 24, 2010.

EDUCATION:

Ph.D.: Physics (with honor)

University of Houston/University of Sidi Bel-Abbes- Algeria, 1996

Advisor: Prof. H. Aourag - University of Belfort- Montbeliard – France
M.S.: Science & Technology (Option: Microelectronics -with honor)
University of Sidi Bel-Abbes, Algeria, 1992
B.S.: Science & Technology (Option Electronics -with honor)
University of Science and Technology of ORAN, Algeria, 1989

EXPERIENCE AND KNOWLEDGE IN TECHNOLOGY COMMERCIALIZATION:

- Acquired a comprehensive set of technology and commercialization assistance tools and training aids offered by Foresight Science & technology, Inc.
 - Experience with Technology Niche Analysis (TNA), a commercialization assistance program.
 - Interaction with Development Capital Networks (DCN) Company which assist in developing business commercial plans.
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DEMONSTRATION IN THE FIELD:

- Initiated nanostructured carbon based thin film electrochemical batteries components fabrication;
 - Initiated the metal core-shell polymeric supercapacitors device with optimum energy storage capability;
 - Initiated the feasibility and deposition of single and multi-capacitor based on BN, BNO, TiN, TaN, Al, Ti, Cu materials for high energy storage-high frequency-high temperature needs;
 - Design and fabrication of functional pressure sensors with wide dynamic range;
 - Achieved BN/CN thin films -based cold cathode applications;
 - Achieved BN/CN/TiN materials films with excellent tribological properties;
 - Demonstrated high-temperature boron nitride diode and different MIS structures based BN/GaN and BN/SiC materials.
 - Reported for the first time, the major chemical trends in the deep-energy levels of isolated sp^3 -bonded substitutional native defects in boron nitride;
 - Proposed a model based on experimental results suggesting nitrogen vacancies for n-type and boron antisite or impurities for p-type BN films;
 - Reported for the first time a local pulsed UV laser annealing of CN films;
 - Reported for the first time the use of a novel multiphoton laser excitation technique to obtain higher photoconductivity (PC) signal from BN wide band gap materials.
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SKILLS:

- Strong theoretical background in solid state physics;
 - Modeling and simulation capabilities using multi-physics coupling variables;
 - Knowledge of FORTRAN language to develop research-oriented programs in the field of electronic and optical properties of crystalline stressed semiconductors: energy band spectra, lattice dynamics, and charge densities of solids. Specialized in using pseudopotential -based approaches to determine the electronic properties of elemental and compound semiconductors.
 - Material science and vacuum knowledge;
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- Growth techniques based PVD/CVD/Sputtering/Laser Ablation systems;
- Upgrading, trouble shooting and maintenance of process equipment;
- Characterization: (LCR, Electrochemical Analysis, Auger, Hall, FTIR, SIMS, I-V, C-V, UV, Field emission, and Laser PC);
- Working experience with personnel computers and workstations (VMS, UNIX);
- Work with deadline;
- Excellent oral and written communication.

PUBLICATIONS:

Article published or “in press” in refereed and proceeding journals (52)

1. N. Badi, S. Khasim, and A. Roy, “Micro-Raman spectroscopy and effective conductivity studies of graphene nanoplatelets/polyaniline composites”, *Journal of Materials Science: Materials in Electronics* (Published online on Feb 22, 2016 – Springer- DOI 10.1007/s10854-016-4556-8).
2. A. Roy, S. Khasim, A. Parveen, O. Al-Hartomy, Z. Khattari, J. N. Ansari, and N. Badi, “Synthesis, Characterization, Dielectric and Rectification Properties of PANI/Nd₂O₃:Al₂O₃ Nanocomposites”, *Polymers for Advanced Technologies* (January 7, 2016 - DOI: 10.1002/pat.3771).
3. A. S. Roy, A. Parveen, N. Badi, and S. Khasim, “Electrochemical cell parameters of poly(ethylene oxide)/(KClO₃+NaNO₃) composites as polymer electrolyte in secondary solid-state batteries”, *Ionics*, 12, 3193(2015).
4. R. Ebrahim, M. Kumar, N. Badi, N. Wu, and A. Ignatiev, “Filamentary bipolar EPIR switching in amorphous silicon”, *J. Vac. Sci. Technol. B* 33, 32205 (2015).
5. N. Badi, “High Temperature Dielectric Properties of (B_xN_yO_z) Thin Films Deposited using Ion Source Assisted Physical Vapor Deposition” *Journal of Advanced Dielectrics* 5, 1550029 (2015).
6. N. Badi, A. R. Erra, F. C. Robles Hernandez, A. O. Okonkwo, K. Martirosyan, and M. Hobosyan, “Low-cost carbon-silicon nanocomposite anodes for lithium ion batteries” *Nanoscale Research Letters*, 2014,9:360.
7. F. Chouit, O. Guellati, S. Boukhezar, A. Harat, M. Guerioune, and N. Badi, “Synthesis and Characterization of HDPE/N-MWNTs Nanocomposite Films”, *Nanoscale Research Letters*, 2014, 9:288.
8. N. Badi, S. Vijayaraghavan, A. Bensaoula, A. Tempez, C. Tauziède, P. Chapon, “P²IMS depth profile analysis of high temperature boron oxynitride dielectric films” *Applied Surface Science*, 292, 1 (2014).
9. N. Badi, A. Bensaoula, A.V. Simakin, and G.A. Shafeev, “Laser Engineered Core-Shell Nanodielectrics with Giant Electrical Permittivity” *Materials Letters* 108, 225 (2013).
10. N. Badi, M. Morales; C. Boney, A. Bensaoula, A. Zomorrodian. “Determination of optical constants and stoichiometry of B_xO_yN_z films deposited by ECR-PVD” *Journal of Non-Crystalline Solids*, 382, 1(2013).
11. N. Badi, A. Bensaoula, A.M. Nair, “Dynamic range and sensitivity of field emission pressure sensors with non-silicon membranes *Applied Surface Science*”, *Applied Surface Science*, 285, 907 (2013).
12. N. Badi, R. Mekala, and F. Robles-Hernández, “Synthesis of Al-Al₂O₃/PVDF Core-Shell Nanodielectrics for Energy Storage Applications”, *NSTI-Nanotech* 2, 646 (2013).

13. N. Badi, R. Mekala, D. Ketharnath, F. Robles-Hernández, J. Wosik, F. Chouit, S. Boukhezar, O. Guellati, and M. Guerioune, “Effective conductivity measurement of CNT/Polymer films using a non-contact microwave technique”, *NSTI-Nanotech 1*, 139 (2013).
14. N. Badi, F. Robles-Hernández, A. Okonkwo, M. Hobosyan, and K. Martirosyan, “Low Cost Carbon-Silicon Nanostructures for High Performance Electrochemical Anode Materials”, *NSTI-Nanotech 2*, 657 (2013).
15. N. Badi, R. Singh, A. Bensaoula, S. Rittikulsittichai, W. Thanasarakhan, and T. Randall Lee, “(Au, Ag)-SiO₂ Core-Shell Nanoparticles Based Polymer Nanodielectrics for Energy Storage Applications”, *Nanotech conference*, ISBN 978 -1-4398-8189-7, 167 (2011).
16. N. Badi, A.M. Nair, and A. Bensaoula, "Simulation of Field Emission Pressure Micro Sensors with non-Silicon Membranes", *Applied Surface Science* 256, 4990 (2010).
17. A. Alemu, A. Freundlich, N. Badi, C. Boney and A. Bensaoula, “Low Temperature Deposited Boron Nitride Thin Films for a Robust Anti-Reflection Coating of Solar Cells”, *Solar Energy Materials & Solar Cells* 94, 921 (2010).
18. J. Pisonero, L. Lobo, N. Bordel, A. Tempez, A. Bensaoula, N. Badi, and A. Sanz-Medel, “Quantitative depth profile analysis of boron implanted silicon by pulsed-rf-GD-TOFMS”, *Solar Energy Materials & Solar Cells* 94, 1352 (2010)..
19. N. Badi and A. Bensaoula, “Nano-Engineered Dielectrics for Energy Storage Solutions”, *Nanotech 2*, 534 (2009).
20. A. Alemu, A. Freundlich, N. Badi, C. Boney and A. Bensaoula, MgF₂/BN double layer antireflection coating for photovoltaic application, *Proceedings of the 33rd IEEE Photovoltaic Specialists Conference*, San Diego, May 2008, page 1-4.
21. A.V. Karabutov, G.A. Shafeev, N. Badi, and A. Bensaoula, “3D Periodic structures grown on silicon by radiation of a pulsed Nd:YAG laser and their field emission properties”, *Applied Surface Science*, 252, 4453 (2006).
22. H. Chen, M. N. Iliev, J. R.Liu, K. B. Ma, W.-K. Chu, N. Badi, A. Bensaoula, and E. B. Svedberg, “Room temperature deposition of diamond-like carbon field emitter on flexible substrates”, *Nuclear instruments and methods in physics research section B* 243, 75(2006)
23. G.A. Shafeev, A.V. Karabutov, A.G. Chakhovskoi, N. Badi, A.M. Nair, A. Bensaoula, Composite Au-Si micro-tip field emitter arrays produced by self-organized laser-induced process, 18th International Vacuum Nanoelectronics Conference, 200510-14 July 2005 Page(s):221 – 222.
24. N. Badi, C. Boney, and A. Bensaoula, “Self-packaged Boron Nitride Capacitor for High Temperature Applications”, *Journal of Microelectronics and Electronic Packaging*, Vol. 1, 4th Qtr, p217 (2004).
25. D. Starikov, I. Berishev, J.-W. Um, N. Badi, N. Medelci, A. Tempez, and A. Bensaoula, "Diode Structures Based on p-GaN for Optoelectronic Applications in the Near-UV Range of the Spectrum", *J. Vac. Sci. Technol. B* 18, 2620 (2000).
26. N. Badi, D. Starikov, A. Bensaoula, V. Ageev, A. Karabutov, M. Ugarov, and E. Loubnin, “*Laser-Induced Modifications of Carbon Nitride Films*”, *J. Appl. Phys.*88, 7197(2000).
27. V. Ageev, M. Ugarov, V. Frolov, A. Karabutov, E. Loubnin, N. Badi and A. Bensaoula, " *X-ray induced modification of BN thin films electronic properties*", *J. Appl. Phys.*88, 7351 (2000).
28. N. Medelci, A. Tempez, D. Starikov, N. Badi, I. Berishev, and A. Bensaoula, “*Etch Characteristics of GaN and BN Materials in Chlorine-Based Plasmas*”, *Journal of Electronic Materials* 29, 1079 (2000).

29. V. Ageev, S. Klimentov, M. Ugarov, E. Loubnin, A. Bensaoula, N. Badi, A. Tempez, and D. Starikov, "Enhanced free carrier generation in boron nitride films by pulsed laser radiation", *App. Surf. Sci.* 138-139, 364-369 (1999).
30. D. Starikov, N. Badi, I. Berichev, N. Medelci, O. Kameli, M. Sayhi, V. Zamorrodian, and A. Bensaoula "MIS Schottky Barrier Structures Fabricated Using Interfacial BN Layers Grown on GaN and SiC for Optoelectronic Device Applications", *J. Vac. Soc. Technol. A* 17, 1235 (1999).
31. N. Badi, A. Tempez, D. Starikov, A. Bensaoula, V.P. Ageev, A. Karabutov, M.V. Ugarov, V. Frolov, E. Loubnin, K. Waters and A. Shultz, "Field Emission from as-grown and Surface Modified BN and CN Thin Films" *J. Vac. Soc. Technol. A* 17, 1191 (1999).
32. N. Badi, D. Starikov, A. Tempez, A. Bensaoula, V.P. Ageev and E. Loubnini, Investigation of BN, CN, and BCN thin films for tribological electronic and optical applications, *Algerian Journal of Advanced Materials* 3, 1 (2005).
33. Tempez, N. Medelci, N. Badi, I. Berichev, D. Starikov, and A. Bensaoula, "*Photoenhanced RIE of III-V Nitrides in BCl₃/Cl₂/Ar/N₂ Plasmas*", *J. Vac. Soc. Technol. A* 17, 2209 (1999)
34. S.M. Klimentov, S.V. Garnov, V.P. Ageev, M.V. Ugarov, A. Bensaoula, N. Badi, A. Tempez, and D. Starikov, "Photo excitation in boron nitride thin films by short laser pulses", Source: *Vide Science, Technique et Applications*, n 287, suppl.issue, Jan.-March 1998, p 700-3
35. Tempez, N. Badi, J. Kulik, and A. Bensaoula, "*Surface composition of BN, CN, and BCN thin films*", *J. Vac. Soc. Technol. A* 16, 2896 (1998)
36. N. Badi, A. Bousetta, A. Bensaoula, and H. Aourag, "*Dynamical Charge and Force Constant Calculations in c-BN under Pressure*", *Phys.Stat.Sol.(b)* 198, 721 (1996).
37. B. Soudini, N. Amrane, N. Badi, H. Aourag, B. Khelifa, Y. Q. Cai, P. Storer, A. S. Kheifets, I. E. McCarthy, and E. Weigold, "Energy-resolved momentum density of amorphous germanium and the effect of hydrogen adsorption by (e,2e) spectroscopy", *Surface Science*, 334, 276 (1995).
38. N. Badi, H. Abid, B. Soudini, N. Amrane, M. Driz, B. Khelifa, and H. Aourag, "*Valence and conduction band-edges-charge densities in Ga_{1-x}Al_xP mixed crystals*", *Mater.Chem.Phys* 38, 243 (1994).
39. N. Badi, H. Abid, B. Soudini, N. Amrane, M. Driz, J.P. Dufour, H. Aourag, and B. Khelifa, "*The uniaxial strain effects on the ternary alloy semiconductor Ga_{1-x}Al_xP*", *Phys.Stat.Sol (b)* 184, p 365 (1994).
40. N. Badi, N. Amrane, H. Abid, M. Driz, B. Soudini, B. Khelifa, and H. Aourag, "*Pressure dependent properties of boron phosphide*", *Phys.Stat.Sol (b)* 185, 379 (1994).
41. N. Badi, H. Abid, B. Soudini, N. Amrane, M. Hammadi, M. Driz, B. Khelifa, and H. Aourag, "*Band structure of Ga_{1-x}Al_xP under uniaxial stress*", *Comp.Mat.Sci* 3, 50 (1994).
42. H. Abid, N. Badi, B. Soudini, N. Amrane, M. Driz, M. Hammadi, H. Aourag, and B. Khelifa, "*Pressure dependence of band gaps in GaAs, GaP, InP, and InAs*", *Mater.Chem.Phys* 38, 162 (1994).
43. F. Benkabou, N. Badi, J.P. Dufour, T. Kobayasi, H. Nara, B. Khelifa, and H. Aourag, "*Pressure dependence of band gaps and the charge densities in Si*", *Phys.Stat.Sol (b)* 109, 109 (1994).
44. M. Driz, N. Badi, B. Soudini, N. Amrane, H. Abid, N. Bouarissa, B. Khelifa, and H. Aourag, "*The alloying and pressure dependence of band gaps in GaAs and GaAs_xP_{1-x}*", *Comp.Mater.Sci.* 2, 287 (1994).
45. H. Aourag, F. Sellal, H. Abid, N. Badi, A. Mahmoudi, and B. Khelifa, "*The high pressure pressure behavior of AlAs*", *Mater.Chem.Phys.* 33, 254 (1993).

46. H. Aourag, G. Merad, K. Ghaffour, H. Abid, N. Badi, and B. Khelifa, “*The high pressure behavior of InSb and β -SiC*”, Comp.Mater.Sci. 1, 78 (1992).
47. M. Driz, H. Aourag, H. Abid, B. Khelifa, and N. Badi, “ *The pseudobinary alloy (Ga, Al)As under hydrostatic pressure*”, Mater.Sci.Eng B25, 159 (1994).
48. F. Driss-Khodja, H. Abid, B. Khelifa, N. Amrane, B. Soudini, M. Driz, N. Badi, and H. Aourag, “*Electronic structure of pseudobinary semiconductor alloy $Ga_xAl_{1-x}Sb$* ”, Mater.Sci.Eng B27, 93 (1994).
49. H. Kalaï, N. Badi, H. Abid, N. Amrane, B. Soudini, H. Aourag, and B. Khelifa, “*Correlation between high pressure effects and alloying in GaP and AlP*”, Mater.Chem.Phys 39, 180 (1995).
50. H. Abid, N. Badi, M. Driz, N. Bouarissa, KH. Benkabou, B. Khelifa, and H. Aourag, “*Electronic structure of the quaternary alloy $Ga_xIn_{1-x}As_yP_{1-y}$* ”, Mater.Sci.Eng B33, 133 (1995).
51. B. Soudini, N. Amrane, N. Badi, B. Khelifa, and H. Aourag, “*Positron annihilation studies in $Ga_xIn_{1-x}As$* ”, Sol.Stat.Commun.96, 987 (1995).
52. S. Al.Khafadji, N. Amrane, N. Bouarissa, N. Badi, B. Soudini, M. Sehil, and H. Aourag, “*Pressure-dependence of electron and positron band structures in elemental semiconductors*”, Phys.Stat.Sol (b) 189, 139 (1995).

Article submitted to refereed journals (1)

53. R. M. Mohite, A. S. Roy, J. N. Ansari, S. Khasim, and N. Badi, “Influence of Indium doping on the properties of spray deposited ZnO thin films”, Nanotechnology Journal 2016 (under review).

Conference Proceedings/Presentations (50)

54. N. Badi and R. Mekala, “Modeling and simulation of high permittivity core-shell ferroelectric polymers for energy storage solutions”, COMSOL Conference, Boston October 9 - 11, 2013.
55. N. Badi and R. Mekala, “Heat-Sink Solution Through Artificial Nanodielectrics for LED Lighting Application”, COMSOL Conference, Boston October 3 - 5, 2012.
56. N. Badi, R. Mekala, F. Robles Hernandez, A. Okonkwo, K. Martirosyan, and M. Hobosyan, “Nanotechnology Pathways to Energy Storage Solutions”, Nano-M&T2013, 17 – 19 November, 2013, Annaba-Algeria.
57. R. Singh and N. Badi, “Nanomaterials and Nanoparticles for Fuel Cells and Energy Conversion Devices”, Nano-M&T2013, 17 – 19 November, 2013, Annaba-Algeria.
58. R. Singh, N. Badi, “Synthesis of Core-Shell Based Artificial Nanodielectrics Via Scalable and Cost Effective Methods”, Nanotech conference, June 18-21, Santa Clara, CA, USA (2012).
59. R. Singh, N. Badi, M. Hobosyan, K. S. Martirosyan, “Graphene/Carbon nanotube (CNT) Reinforced Nanocomposites for Energy Storage Sustainable Buildings”, Nanotech conference, June 18-21, Santa Clara, CA, USA (2012).
60. R. Singh, N. Badi, M. Hobosyan, K. S. Martirosyan, “Reactivity Enhancement of Nanoenergetic Materials Through Functionalized Al@ Bi_2O_3/I_2O_5 Core-Shell Architecture”, Nanotech conference, June 18-21, Santa Clara, CA, USA (2012).
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71. N. Badi, S. Vijayaraghavan, A. Tempez, P. Chapon, N. Tuccitto, A. Licciardello, and A. Bensaoua, "Boron Oxynitride as Gate Dielectric Films for Future CMOS Technology", 55th AVS conference, Boston, October 2008.
72. N. Badi, S. Vijayaraghavan, A. Tempez, N. Tuccitto, and A. Bensaoua, "Boron Oxynitride: An emerging dielectric for High Temperature Capacitor Applications", 55th AVS conference, Boston, October 2008.
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76. N. Badi "Boron Nitride Capacitor for High Temperature High Energy Density Applications", Industrial Day, Raytheon Missile Systems, Tucson, AZ. July 26-28, 2005.

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 99. N. Badi, A. Bensaoula, A. Bousetta, and H. Aourag “*Growth and Characterization of Deposited Nitride Thin Films Based Boron, Carbon, and Nitrogen Elements by Ion and Neutral Assisted Molecular Beam Epitaxy*” MicroMaterials Conference "MicroMat 1997 Berlin, April 16 - 18, 1997.
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 101. N. Badi, A. Tempez, A. Bensaoula, K. Waters, and A. Shultz, " *Synthesis and Characterization of BN and BCN thin films by Ion and Neutral Assisted Molecular Beam*

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PROFESSIONAL SERVICE'

Serving as editorial board member of the following journals:

- World Journal of Nano Science and Engineering (WJNSE): <http://www.scirp.org/Journal/EditorialBoard.aspx?JournalID=493>
- Journal of Solar Energy (JSE): <http://www.hindawi.com/journals/jse/editors/>
- International Journal of Advanced Renewable Energy Research (IJARER): <http://grsci-techpress.org/editors/editorial-board.php>
- Frontiers in Energy Research: http://www.frontiersin.org/Energy_Storage/editorialboard
- Advances in Energy Research (ERi): <http://www.techno-press.org/?journal=eri&subpage=2>
- International Journal of Nanoelectronics and Materials (IJNeaM): http://ijneam.unimap.edu.my/index.php?option=com_content&view=article&id=46&Itemid=53
- Scientific Journal of Management Science and Engineering (SJMSE): <http://www.sjmse.org/editorialBoard.aspx>
- Materials Sciences and Applications (MSA): <http://www.scirp.org/journal/msa/>
- Journal of Power Sources (pending).
- Served on the International Program Committee at the 2nd International Conference on Green Energy and Technology (ICGET), 5~6 September, 2014, Dhaka, Bangladesh <http://cennser.org/ICGET/committee.html>
- Served as a member of The Sigma Xi Research Award jury, April 2002, University of Houston
- Director: UH-DGRSDT Collaborative Research Training, Management, and Mentorship Program in Sustainable Energy Development – Sponsor: General Directorate for Scientific Research and Technological Development (Algeria - 2010).
- Served as HCC student mentor for the Undergraduate Students Research Program (USRP), summer 2006, University of Houston.
- Served as a judge on International Sustainable World Energy Engineering Environment (I-SWEEEP) Project. Houston May 5, 2012.
- Nominated in 2013 to serve as:
 - At-large Senator on the University of Houston Faculty Senate.
 - Faculty Senator on the Research & Scholarship Committee of the Faculty Senate.
 - Faculty Senator on the Undergraduate Committee of the Faculty Senate.

- Nominated in 2014 to serve as Vice President of the Scientific Committee at the University of Tabuk in charge of the Fifth Students' Forum of the Saudi Universities.
- Seminar Series co-organizer in the College of Science at the University of Tabuk (Nov 2014 – Present).
- Organization of “COMSOL Multiphysics Simulations” workshop on 15/3/2015 at the University of Tabuk, in collaboration with the Elnady Engineering & Agencies.

PROFESIONAL AFFILIATION:

- Materials Research Society (MRS)
- American Vacuum Society (AVS)
- AAAS (American Association for the Advancement of Science)

SCIENTIFIC ACTIVITIES WITHIN THE DEPARTMENT/COLLEGE/UNIVERSITY:

1. Served as the Principal Investigator in the research project No. S-1436-0146 - funded by the University of Tabuk.
2. Served as Co-Principal Investigator in the Research Project No. S-1436-0035 - funded by the University of Tabuk.
3. Serving as Principal Investigator in the research project No. 15-NAN5048-48 - in the process of funding by the King Abdul Aziz City for Science and Technology (KACST) with the unit (NSTIP)
4. Served as the Chairman of the Committee on Graduate Studies and Scientific Research for the years 1435/1436 and 1436/1437.
5. Compiled/reported scientific publications of the Department from the years 2011 to 2015.
6. Prepared/submitted a report on the department of scientific achievement in 1435/1436 AH
7. Reviewed/Revised the Master's program in physics.
8. Served as academic adviser for 15 students.
9. Moved the Nanotechnology Research Laboratory equipment from the old building to the new Faculty of Science building.
10. Served as supervisor for the Nanotechnology Research Laboratory.
11. Organize/coordinate workshops or seminars at the College of Science.
12. Prepare questionnaires on funded research projects at the College of Science.
13. Member of the College Committee of Graduate Studies and Scientific Research as a representative of the Department of Physics.
14. Organized a workshop at the University of Tabuk under the title of "multi-physics simulation COMSOL cooperation on 05.24.1436H.
15. Served as Vice-President of the Scientific Committee and Jury university in the Fifth Forum for University students for the year: 1435/1436 AH.
16. Serving as a counselor for the Vice-Provost of Scientific Research at the University.

SERVICE TO THE PROFESSION/ACADEMIC DISCIPLINE

Grants & Papers Reviewer:

The Petroleum Research Fund
 National Science Foundation (NSF/ CTS & DMR)
 Qatar National Research Foundation (QNRF)
 Journal of Vacuum Science and Technology B

Physical Review B
Thin Solid Films
Applied Surface Science
Journal of Alloys and Compounds
Materials Chemistry and Physics
World Journal of Nano Science and Engineering
International Journal of Nanoelectronics and Materials

TEACHING AND STUDENT LEARNING

Courses taught at the University of Tabuk, KSA

- General Physics 2, Quantum Mechanic 1, Electrical Circuits, Electromagnetism 2, Electronics Lab, Research Projects

Courses taught at the University of Sidi Bel-Abbes, Algeria

- Solid State Physics
- Electronics and Electrical measurements
- Integrated electronics and circuits design
- Robotics
- Mathematics/Physics
- Technical English

Curricula developed at the University of Sidi Bel-Abbes, Algeria

- Experimental setups of electrical measurement classes:
Physics I & II
Electricity I & II

TUTORING AND SUPERVISION OF RESEARCH:

- Kevin Springer (Junior) in Physics, UH, 2013
- Rakesh Mekala (MS candidate) in Electrical engineering, UH, 2013
- Deepak Musuwathi Ekanath (M S candidate) in Electrical engineering, UH, 2012
- Aljoscha Puchstein (Junior) in Physics, UH, 2011
- Ayman Al-Bataineh (Ph.D. candidate) in Physics, UH, 2010
- Rajesh Bikki (MS candidate) in Electrical engineering, UH, 2010
- Siddharth Vijayaraghavan (MS candidate) in Electrical engineering, UH, 2009
- Vinodh Raj Mylapore (MS candidate) in Electrical engineering, UH, 2009
- Liliam E. Fernandez (Junior) in Physics, HCC, 2006
- Akhil Nair (MS candidate) in Electrical engineering, UH, 2004
- James Evans (MS candidate) in Mechanical engineering, UH, 2002
- Kun He (MS candidate) in Electrical Engineering, UH, 2002
- Nathan Withers (MS candidate) in Computer Science, UH, 2002

COLLABORATORS:

Academic:

- University of Pennsylvania – Prof. D. N. Talwar
- Wave Research Center at General Physics Institute of Russia – Prof. G. Shafeev

- University of Houston Center for Advanced Materials – Prof. A. Ignatiev
- Rice University – Prof. R. Vajtai
- Rice University – Prof. P.M. Ajayan
- Texas A&M University – Prof. P.P. Mukherjee
- University of Texas at Brownsville – Prof. K. Martirosyan
- University of Houston – Prof. F. Robles-Hernandez
- University of Badji Bokhtar – Annaba – Algeria – Prof. M. Guerioune
- University of Belfort- Montbeliard – France – Prof. H. Aourag
- Nanyang Technological University – Singapore – Prof. T. Chen
- Southern Illinois University – Prof. S. Aouadi
- University of Quebec at Montreal - Dr. M. Boukadoum
- Argonne National Laboratory, Division of Materials Science – Dr. O. Auciello
- International Center for Materials Nanoarchitectonics ICYS-MANA-NIMS Japan – Dr. H. Hamoudi.

Industrial

- Peregrine Power, LLC – Dr. D. Marckx
- ITN Energy Systems, Inc. – Dr. Raghuvir Singh
- TCE QSTP, LLC – Qatar – Dr. N. Agnihotri
- IPG Photonics Corporation - Dr. I. Berishev
- Texas Component Corporation - Dr. R. Schendel
- Ionwerks, Inc., Dr. Schultz, President
- Semetrol, Inc. – Dr. D. Johnstone, President