Summary of Major Career Accomplishments: Aswini K. Pradhan

I have excellent academic experience and research accomplishments at national and international level, including at Norfolk State University (NSU), Virginia Commonwealth University (VCU), University of Virginia (UVA), as described in my CV. This clearly demonstrates how I have created positive impact, and played a major role in bringing their programs to national and global prominence. I have served as the project director of **THREE** major Center grants of excellence, managing research, education, training and people. The HBCU environment, and the diverse cultures of NSU, has given me a broad perspective on both academic/research and administration and trained me with a diverse challenges and opportunities. My experience at NSU, VCU, UVA and internationally acclaimed organizations, such as, ISTEC-Japan, Physics Department Tokyo Unuversity, Clarendon Lab, Oxford University and BARC-India allowed me to demonstrate strategic, visionary, and entrepreneurial leadership at both department and university levels.

I have browsed the faculty and department profiles within the Department of Physics, and the University's Strategic Plan, Transforming Lives Through Discovery/research/education -Vision. Considering my current and prior academic and research experience, I have demonstrated accomplishments in every category of the Strategic Plan: (a) Teaching, Learning, Mentoring and Programs development; (b) Diversity; (c) International Collaborations; (d) Extensive Outreach Programs; (e) Extensive Research (including Establishing the World Class Laboratory) and Creative Activity; (f) Economic Development; and (g) Resource Stewardship. Considering all aspects, I believe that the above activities match is ideal for the needs of the Physics Department.

I have demonstrated excellence in the design, synthesis and processing of innovative materials for research in the field of condensed matter Physics, having a solid track record in materials development and/or characterization. I am a leading researcher and academician in the field of materials and computational Physics for the next generation advanced functional materials synthesis and engineering of nano- and quantum materials for energy generation and storage and biomedical applications. I have established a state-of-the-art multimillion Dollar ($15M) Nanotechnology laboratory at Norfolk State University and developed a strong funding history, directing three "Center of Excellence", establishing strong research and academic culture by graduating and mentoring a cohort of students. I manage micro/nano-materials fabrication, characterization, Nanotechnology/Thin film labs and *Clean-room facility*. I am an internationally recognized scientist and earned reputation in the field of condensed matter Physics.

Nano-Materials with novel and controlled electronic, optical, and magnetic properties have widespread applications. *I am broadly focused on developing teaching (both graduate and undergraduate) and research programs in the areas of several frontiers of experimental condensed matter Physics, including renewable energy and energy storage using nanotechnology to semiconductors, nanomaterials and devices for energy, biomedicals & sensor technologies, measurement/metrology, or other emerging 2D-nanoscale materials related to cross-disciplinary programs which may very much complement to the Physics Department.*

In recent years, I have made several very important innovative and original research discoveries in the field for advancing condensed matter experimental physics in a broad area, including advanced functional materials, next generation nanomaterials for energy harvesting and biomedical applications, including cure and advance detection, nuclear detector etc.

These include:

(a) *Development of Advanced functional materials and devices: Oxide semiconductors, Phase Change materials, Detectors, MTJ, Ferro/Piezo/magnetoelectric and Multilayers.*
(b) *2-D materials and emerging novel nanomaterials and devices.*
(c) *Growth and fundamental Studies of advanced semiconductor materials.*
(d) *Development and understanding of Nanomaterials for bio-medical applications, Nanostructures and nanotechnology for point-of-care diagnostic tools.*
(e) *Plasmonic nano-/ metamaterials and nanostructures for molecular sensing.*
(f) *Development of Nanomaterials for energy harvesting, and storage.*

I have extensive record of scholarly achievements and publications. I have worked in the frontier direction of nanotechnology for generation and storage of energy, innovative electronics as well as for biomedical applications. I have published more than **300 refereed papers** in reputed international journals, several book chapters and more than 180 presentations in national and international conferences and symposium. I have been awarded several prestigious awards, including distinguished faculty award (2010), research mentor of the year (2007-2016), and Research excellence by the Government of India (2011). I am the recipient of 2015- *State Council of Higher Education of Virginia* (***SCHEV) award for Outstanding Faculty of Virginia***.

Substantial experience obtaining grants and contract: I have a strong track record in securing funding and directing major projects and teams involving academic, industrial, and government participants. I have bought about **$27M** to Universities through grants through my leadership. These grants have already enhanced the research and research infrastructure and will boost the research capacity and infrastructure at Universities and will help the College of Science, Engineering and Technology at NSU and will provide an opportunity for students with diverse backgrounds to pursue research and education in STEM fields for high-tech careers.

Domestic and international research relationships and partnership: I have demonstrated experience in establishing domestic and international research relationships and partnerships. At present, I have partnership with University of Puerto Rico (UPR) though NSF-CREST supplement and other Universities such as Cornell, John Hopkins, University of Nebraska, ODU, VCU, Virginia Tech, Louisiana State University (LSU) etc. I have developed International research collaborations with Mexico, South Africa, Taiwan, India, Poland and Japan.

Project management and organizational skills: I have experience managing and leading a large group of interdisciplinary faculties, staff, partners, graduate students, undergraduate students, budgets, and other resources through managing Center and other grants. I have managed at least twenty faculties through the management and administration of several grants, eight research associates, three office assistants, and twenty graduate students containing both Doctoral and Master students and dozens of undergraduate students. I have demonstrated ability to attract and secure increased resources for University.

Managing Laboratories and regulatory mandates: I have established state-of-the-art laboratory with modern nanotechnology based equipment and facilities, which are unique to this region. I am a member of the Management Committee for the ***CLEAN ROOM*** facility. I chaired the facility and safety committee for both CMR and Engineering Department.

CURRICULUM VITAE

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Tel. Ph. 757-639-4941

Citizenship: *US Citizen*

ACADEMIC QUALIFICATIONS

Ph.D. (Cond. Mater Experimental Physics) Indian Institute of Technology, 1988
M.S. (Cond. Mater Physics, Electronics) Utkal University, India, 1983
B.S. (Physics Honors with Dist.) Utkal University, India, 1980

RESEARCH EXPERIENCE AND OCCUPATIONAL HISTORY:

2010+ **Professor**, Department of Electrical Engineering and Center for Materials Res., Norfolk State University (NSU); ***Director of Thin Film and Nanotechnology Laboratories***

2010+ 2017 **Director**, NSF-CREST Center for Nano and Bio-inspired Mat. & Devices (CNBMD)
2016+ 2017 **Director**, NSF-CREST Center- Renewable Energy and Advanced Materials (CREAM)
2010+2015 **Director**, DoD Center of Excellence for Advanced NanoMater. & Devices (CEAND)

2003- 2010 Associate Professor, Department of Engineering, Norfolk State University (NSU)

2002-2003 **Assistant Professor**, Electrical Engineering, Virginia Commonwealth University

2001-2002 Research Professor, Dept. of Physics, University of Virginia

2001 **Visiting Professor**, Dept. of Applied Physics, *(Center for Exc. in Res.*), **Tokyo University, *Japan***

1995-2001 **Senior Scientist** at *Superconductivity Research Lab, (ISTEC), Tokyo*, *Japan*.

1992 **Visiting Research Fellow** at *Blackett Laboratory,* Imperial College, London

1991-1992 **Research Fellow** at the *Clarendon Laboratory*, **Oxford University, U.K**.

1990-1995 Senior Scientist at Center for Advanced Technology, BARC, India.

Executive/Managerial/Management Capabilities: Brief descriptions

(1) Leading Change

Dr. Pradhan has brought several changes at academic places. Some of them are outlined below:

(a) Increasing recruitments for URM male/female graduate (both MS and Ph.D) students in STEM fields through federal funding (both NSF and DoD).
(b) Funding summer research for a large number of undergrad as well as high school STEM students.
(c) Started Local ***MRS Student Chapt.*** for better participation in confs, networking and presentation skills.
(d) **Huge enhancement in research infrastructure** (about $15M facility) at Norfolk State University through basically NSF and other federal funding. This created a large interest in STEM research for URM students. Further, this created enthusiasm in young STEM faculties for research and student supervision, and most of them are URM faculties.
(e) Expanded institution research horizon to Nanotechnology, Renewable energy research, Nanoelctronics & Nanodevices, Biomedicals, and outreach using Nanodays, summer research etc. very successfully.

(2) Leading People

Dr. Pradhan has been leading several faculties and other personnel as **Center Director of THREE Centers**, Chair of Committees and facility Director of both CMR and Engineering.

(a) **Supervised/Supervising TEN Research Associate Professors**: Dr. K. Zhang, Dr. M. Bahoura, Dr. D. Biswal, Dr. C. Samantaray, Dr. Bo Xiao, Dr. Q. Yang, Dr. Jonathan Skuza and Dr. S.K. Pradhan, Dr. R. Mundle, and Dr. D. Pradhan.

(b) **Faculty Mentored:** Dr. Frances Williams (Engineering), Dr. M. Bahoura (Engineering), Dr. O. Oyesanya (Chem.) and Dr. Victor Adedeji (Physics, Elizabeth State Univ.).

(c) **Staff:** Several Administrative Assistants For Center management.

(d) Students Graduated: MS students: 65 (Materials Science & Optical/ elect. Engineering)

Students Graduated: Ph.D students: 12 in Materials Science & Engineering (MSE).

(3) Results Driven Leadership

Consecutive success in leading smaller funded projects from industry, large grants from NSF, DoD. Led as Principal Investigator and Director of THREE large Center of excellence, leading group of interdisciplinary faculties and Co-PIs and Investigators, and more than 20 faculties. Leading activities in Center for Materials Research and Department of Engineering. Took leadership to establish Ph.D. program in Materials Science & Engineering, and Mechanical Engineering in the Engineering department. Managed Microelectronic research group at Virginia Commonwealth University. Led a group of research scientists at ISTEC-SRL, Japan. Established a research group and laboratory at CAT-BARC.

(4) Building Coalitions/Partnership

I have especially built collaborations with other minority Schools as a part of building coalition partnership in STEM education for URM students. I have built strong coalitions with academic units, Universities, Institutes, Government laboratories, industries and **International** partners. Apply Supplements for Center grants.

I have demonstrated experience in establishing domestic and international research relationships and partnerships through my previous international experiences. I have an established team of researchers through out international Universities and US, including Brookhaven National lab. *I have demonstrated skill in establishing synergies among diverse areas. I will strengthen and establish strong collaboration with School of Engineering, Medicine, Physics/Chemistry/Biotechnology.*

Initiatives: New initiatives in the college, such as, Learning communities, Engineering Leadership etc., by providing a unique opportunity to significantly impact the visibility of the college.

Will Provide leadership in the areas of curricular and programmatic innovations, program assessment, and faculty affairs, international collaborations; Track the key indicators in the college strategic plan and in developing new initiatives; managing the student development initiatives.

SCIENTIFIC AND PROFESSIONAL SOCIETIES MEMBERSHIP

Served as a board member of Magnetics at ISTEC. I was leading the group at Microelectronic center at Virginia Commonwealth University on the development of semiconductor-based (GaN & ZnO) and perovskite spintronic materials. Cited as leading researcher in opto-electronics.

Professional Memberships

- International Society for Optics and Photonics (SPIE) (Organizing Comm.)
- Materials Research Society (MRS)
- Electro Chemical Society (ECS)
- American Vacuum Society (AVS)
- American Institute of Physics (AIP)
- American Physical Society (APS)
- Optical Society of America (OSA)

HONORS AND AWARDS

- ✓ **1997 & 2000 ISTEC-Awards for excellence in Research**
- ✓ Marqui's Who's Who in America, 2005.
- ✓ **Research mentor of the Year, 2006 to 2016 at Norfolk State University**
- ✓ **Adjunct Faculty:** Institute of Materials Science, India (nominated by the Govt.).
- ✓ ***2010 Distinguished Faculty Award*** **of Scholarship at NSU (The most prestigious award)**
- ✓ **2011 Editorial Board for World Journal of Condensed Matter Physics (WJCMP), Materials Processing for semiconductors (Elsevier),** ***Scientific reports*** **(Nature.com).**
- ✓ ***2011-12 Samanta ChandraSekhar Award for Excellence in Research, Awarded by the Government of Orissa, India*** **(The prestigious award of ORISSA)**
- ✓ ***2015: Recipient of SCHEV*** *(State Council of Higher Education of Virginia)* ***Awards for outstanding faculty of Virginia: (http://www.schev.edu/adminfaculty/OFA/2015/Pradhan.asp)***
- ✓ ***2015: Nominated and applied for the Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM)-NSF for White House initiative.***
- ✓ *2014-2015:* ***Star Award*** *for Outstanding Service to the College of Science, Engineering and Technology of Norfolk State University.*
- ✓ ***2015: R &D 100 Awards for Technology and Innovation Finalist***
- ✓ ***2016: Nominated for the University Professor at NSU (Highest lifetime award)***
- ✓ *2015-16: In honor of the 80th Anniversary Norfolk State University "****Founders Day Award"*** *for the commitment to excellence in Science, Research and leadership.*
- ✓ *2017: Nominated for Biju Patnaik award for excellence in Science, Engineering and Technology, Govt. of Odisha, India.*
- ✓ ***2017: R &D 100 Awards for Technology and Innovation Finalist (ElectroPlus)***

Research Proposals funded: Principal Investigator/Co-PI of R&D awards (More than M26$)

1. **STTR-NSF:** Development of ZnO Spin Field effect transistor (FET) -Co-PI, $100K/year for 3 years, Place: Electrical Eng., Virginia Commonwealth University

2. **MRI-NSF:** Acquisition of SQUID Magnetometer for ferromagnetic semiconductors and oxides-Co-PI, $159,418, Place: Electrical Eng., Virginia Comm. University

3. **NSU-INTEL Corp.: PI**-Fabrication of single crystalline Manganite Perovskite Films on STO buffered Si Substrates: PI.,Total award amount: $130,000 (awarded), Award Period: 01.01.05-12.31.07.

4. **NSF-RISE**: Enhancement of Research Infrastructure in Support of the New Ph.D. Program in Materials Science and Engineering at Norfolk State University, **PI.**, Total award amount: $1M (awarded), Award Period: 01.09.07-08.31.09.

5. **MRI-NSF:** Acquisition of Electron Probe Micro-Analyses (EPMA) for Research and Education -**PI**, $500,000 Place: ODU and Norfolk State University, 2008.

6. **NSF-RISE**: Research and Infrastructure Support for Renewable Energy at Norfolk State University, **PI**. Total award amount: $1M, Award Period: 01.09.09-08.31.12.

7. **DoD:** Research and Education in Development of Multifunctional Sensors and MEMS Devices, **Co-PI**, Amount: $565,000, Award Period: 06.15.11-06.14.14.

8. **DoD-**MURI: High-k dielectrics for Innovative electronics, 2009 (Finalist)

9. DoD: Home land Security: Integration of novel transparent conducting oxide electrodes to Cadmium Zinc Telluride for high-performance nuclear radiation detector applications, 2015.

10. **IGERT:** Integrative Graduate Education and Research Traineeship in Magnetic and Nanostructured Materials, **Co-PI**, **$M3.1**, 2010-2016.

11. ***NSF-CREST: Center for Nano and Bio-inspired Materials & Devices (CNBMD), Director &PI, $5M, October 2010-2016: Supplement project of 100K to UPR, Puerto Rico.***

12. **MRI-NSF**: **PI:** Acquisition of an Electron-Beam Lithography System for Advanced Engineering Applications and Integration. $ **535,000: Awarded in 2010.**

13. ***DoD-2010 Center of Excellence for Advanced Nanomaterials & Devices (CEAND), $4.75M, PI and Director, Award period: 2011-2016.***

14. ***DoD-2010 Supplement to West Case Reserve University, Old Dominion Univ. and Georgia Tech. Res. Ins.***

15. **NSF-PREM:** *Partnership for Advanced Functional Metamaterials* (*META*-PREM), Senior Investigator, **$3.22M, 2012-2017.**

16. **NSF-**Fabrication and Characterization of Composite Contacts on Wide Band Gap semiconductors, **Co-PI, 200K**.

17. **HBCU-RISE**: Enhancement of Research Infrastructure for the Development of Nanoelectromechanical System Devices and Materials, **Co-PI**, (Funded, 2013-2016).

18. Nanostructures-based Lab-on-a-Chip Biosensing Devices for outer space health monitoring, **NASA** Award, **PI**, $50,000/year for 3 years, Funded from 2015-2018.

19. *Novel Colorimetric Amplification Technology, STTR, PI, $225,000,* ***Funded, 2016****.*

20. NSF CHE REU 1560240 Food-Energy-Water Systems, Co-PI with Virginia Tech., $350,000, 2016- **Funded**.

21. NSF-Fabrication and Characterization of Composite Contacts on Wide Band Gap semiconductors, Co-PI, 300K.Funded.

22. ***NSF-CREST**: Center for Renewable Energy and Advanced Materials (CREAM), **Director &PI**, $5M years, July 2016-2021, Funded*

23. DoD: 2016, High Efficiency Localized Surface Plasmon Coupled Nanostructures for Lab-on-a-Chip Biosensing Device, DoD, Army Research lab

24. **NSF-ERC**: 2016: Nanosystems for Health and Energy (NHE), PI:Pradhan Norfolk State University (lead) with Case Western Reserve University (Limimg Dai), Eastern Virginia medical School (Dr. Semmons), Virginia, Texas Tech. University (PI: Harvind Gill), University of California, Davis (Nitin Nitin).

25. **NSF-EFRI 2-DARE**: 2016: High-performance Electronic devices from colloidal nanocrystals packaged by atomic layer deposition.

26. **BAA-ARO (PI)***:* Acquisition of Transmission Electron Microscope for Advanced Engineering Applications and Integration. $ **500,000: Awarded in May, 2017.**

MAJOR SERVICE ACTIVITIES

University
Curriculum Committee: Engineering & Center for Materials Research
Dissertation Committee: MSE (MS and Ph.D)
Promotion and Tenure Committee: Engineering
Faculty Selection Committee: Chair and Member
Materials Science Qualifier Committee: Chair
Director: Thin film and Nanotechnology Laboratory/Center
Chair: CMR & Engineering facilities
Member: Clean Room Committee
Chair: Safety Committee
Admission Committee: Engineering and Materials research
Engineering Chair & CMR Director Search: Committee Member

Community
NSF JAM, 2009, 2010, 2011, 2012, 2017
SPIE, ECS & MRS, AVS: ***Invited Speaker & Member (Organizing Committee)***
MEXICO: **INTERNATIONAL TALK SERIES:** 2nd Meeting on the Thematic Network of Complex Materials and Nanostructures" during 24th - 26th November, 2010

Discipline
Technical Reviewer: NSF Merit Review Panel, DoD and DoE proposals, ARC
Technical Reviewer: Phys. Rev. B, Phys. Rev. Lett., Materials Res. Soc., J. Phys. Chem., Nature Commun., Editorial Board-Scientific Reports (nature.com).
Technical Reviewer: Optics Letters, Optics Express, JOSA, SPIE journals
Technical Reviewer: J. Electronic Materials, Thin Sol. Films, other Elsevier journals
Technical Reviewer: AIP and APS journals, IOP, EJP journals

PARTICIPATION IN STEM EDUCATION/OUTREACH

- ***NanoDays*** is a community-based educational outreach event to raise public awareness of nanoscale science and engineering in local communities. The NanoDays event is part of a national effort by the Nanoscale Informal Science Education Network (NISE). NanoDays activities bring university researchers together with science museum educators, creating unique learning experience, this has been regularly at the Children's Museum of Virginia (CMV). NanoDays engages people of all ages in a miniscule world where materials have special properties and new technologies have spectacular promise. Hands-on-activities were complemented by informative posters throughout the museum.
- ***FIRST Tech Challenge (FTC) Robotics Tournament*** held every year in January at Norfolk State University. The FTC tourney was held in collaboration with Virginia FIRST, BAE Systems, etc. The tournament featured twenty high school robotics teams, over 200 students plus parents and teachers, from across the Commonwealth of Virginia. FIRST, For Inspiration and Recognition of Science and Technology, is a World-wide effort that impacts more than 200,000 students. Participants are ideal candidates for STEM careers, and the rate of STEM matriculation is about three times that of the general population. This program was partially sponsored by Dr. Pradhan.
- ***Nano-Express*** event at NSU: Mobile nanotechnology science event operated by Howard University exhibiting some of the latest nano-science and technology in a variety of disciplines. Dr. Pradhan's group managed this event at NSU.
- ***Nanotechnology Module hands on activities:*** Dr. Pradhan's group developed and delivered a for a new course STM 101 to 8 Virginia Beach Public High schools serving 50 students. This is an after school STM 101 Course in which successful students receive three hours of college elective credit. This course has several modules including: math, physics, chemistry, biology, engineering, biology, and computer science. The course was delivered simultaneously to the 8 high schools from one location using real time teleconferencing tools. *To our knowledge, this is the first STEM course in its kind nationwide.*
- ***Summer Research****: This project was introduced to 25 high school and 25 undergraduate students during their* ***summer research*** *under NSF-CREST and DoD projects. Ten experimental modules were developed and implemented for high school students. Dr. Pradhan coordinated undergrad student research.*

Collaborations:

Clarendon Lab., Oxford University, Nuclear Sc. Centre, New Delhi, Birmingham and Cambridge University, U.K., Boston College, SRL, JST-Japan, Tokyo University, Tokyo Institute of Technology, Institute of Non-ferrous materials, China, Institute of Mat. Sc. and Center for Adv. Techno., India, UVA, VCU, ODU, Elizabeth State University, Fisk University, University of Nebraska, Institute of Physics, The college of William and Mary, Jefferson FEL, University of Maryland, Univ. of Puerto Rico, Brookhaven and Oakridge National Labs, North Carolina State University, LSU, and many more.

I have worked at various reputed International laboratories with a capacity to lead a group/division and set-up Laboratories. I played a key role for fabrication of state-of-the-art materials and their characterization at SRL/ISTEC, Japan, at Electrical Eng. Department at VCU. I have established a state-of-the-art lab for

various semiconductors, magnetic, electronic, biological, photonic and sensor applications at NSU apart from the nanotechnology lab.

I have received widespread recognition in the field. I have delivered many invited lectures in National and International conferences, seminars and discussion meetings. I have been in the field of research and development more than 25 years and I have extensive interdisciplinary research experience.

Classes Taught:

OEN 360: Optical Materials: Optical Engineering: **Undergraduate** Class

OEN/MSE 530: Optical Materials: Optical Engineering: **Graduate** Class

MSE/MATS 530: Introduction to Materials Science & Engineering: **Graduate** Class

MSE/MATS 535: Electronic and Photonic Materials: **Graduate** Class

MSE 704: Thin Film Phenomena: Materials Science & Engineering **Graduate** Class

MAE/EEN/MSE 663: Solid State Devices/Electronic materials and Devices: **Graduate** Class

OEN/EEN 590, MEMS/NMEMS,

OEN 490/EEN 410 Seminar, **Nanophotonics and electronics**

Students Graduated: MS students: 65 (Materials Science & Optical/ elect. Engineering)
Students Graduated: Ph.D students: 12 in Materials Science & Engineering (MSE).

Present Research/Education Interest: Dr. Pradhan has strong expertise in Materials Discovery & Physics, Naomaterials, and Computational Materials Design. He has an international reputation with an established record of excellence in research and innovation (see the patents). In addition, Dr. Pradhan is a dedicated educator with substantial experience in deploying new pedagogies. He has set up a laboratory for material discovery and innovation, which integrates computation, and synthesis and characterization, by developing extensive collaborations with local/overseas research institutions, private sector and government agencies. He has provided strong leadership by building a dynamic research team. His has keen interest in materials *novel Energy harvesting and storage, Nanotechnology, Advanced functional materials, Nuclear/environmental detectors and Biomedical sensors for point-of-care diagnostics.*

The research field is mainly focused on:

(a) Development and understanding of Advanced functional materials and devices: Oxide semiconductors, Phase Change materials, MTJ, Ferro/Piezo/magnetoelectric and Multilayers, magnetic materials.
(b) Growth and fundamental Studies of advanced semiconductor materials
(c) 2-D materials and emerging novel nanomaterials and devices.
(d) Development and Understanding of Nanomaterials for bio-medical applications, Nanostructures and nanotechnology for point-of-care diagnostic tools.
(e) Plasmonic nano-/ metamaterials and nanostructures for molecular sensing.
(f) Development of Nanomaterials for energy harvesting, and storage.
(g) Design of novel materials and devices using advanced computational tools for modeling, simulation (Materials Studio, COMSOL etc.)
(h) Semiconductor processing and device, High-k dielectrics, engineering of materials
(i) Nanotechnology (Quantum dots, nanoparticles, artificial nanostructures by nanolithography)

PUBLICATIONS: I am an author and co-author of more than **300 refereed publications** in Internationally reputed journals, more than **180 publications in National and International conferences** and have made a significant contribution to the growth of materials and understanding of many novel phenomena and experimental facts in the field of both applied, basic Physics, Chemistry, Engineering and Materials science as shown by the attached list of research publications.

Diversity Statement:

Dr. Aswini Pradhan has a long history of mentoring at least in three US Universities, University of Virginia, Virginia Commonwealth University and the at Norfolk State University (NSU) since 2001. Dr. Pradhan mentored underrepresented minority (URM) students and faculties in STEM discipline in majority at NSU since 2003. **Although he has been mentoring a large number of students and employees since 1988 (30 years) in various capacities, he has been mentoring (URM) students and faculties since last 15 years. He is a champion of URM mentoring and received state recognition as Outstanding Faculty of Virginia.**

REASON FOR TARGETING THE CHOSEN POPULATION OF STUDENTS, TRAINEES, AND/OR EARLY CAREER SCIENTISTS AND ENGINEERS (URM STUDENTS):

In order to fulfill the goal of the university, Dr. Pradhan led a team of multidisciplinary faculties to seek funds from various agencies, and was successful in obtaining funds that made a significant impact on underrepresented minority groups *via* research and education. The success of these grants promoted diversity in STEM disciplines, innovative and relevant education, outreach initiatives to recruit, retain and train members of underrepresented minority (URM) groups and preparing minority students for leadership positions in the fast-changing, global scientific and engineering community. *He took this opportunity to serve, educate and mentor a large number of URM student population, both female and male African Americans, in STEM.*

The achievements are due to purely scholarly activities to obtain sufficient grants, high-end research capability in publishing World-class research articles, establishing excellent research infrastructure which was not available at NSU and outstanding mentoring and outreach capability of Prof. Aswini Pradhan.

Description of the activities and Strategies employed as a mentor:

(a) Design of the mentoring activities to meet the needs and interests of the mentees:

Dr. Pradhan has designed the mentoring program for a relatively large group of students (above 10 or so at a time). Although he prefers to mentor each student individually, he practices a technique, "**Mentoring under mentoring**" – an umbrella for strong learning ethics, as he has discussed in his mentoring philosophy section. He used the design called "**PRIiSM**" as (a) **P**roductivity, (b) **R**esponsibility, (c) **I**ndependence & **i**nspire, (d), Development of team **S**pirit, and, (e) Development of **M**entoring capability (***PRIiSM***) as essential development and mentoring tools. This practice is followed with individual students as well as post-doctoral associates and junior faculties in some respect taking into their progress in all respects.

He communicates with his mentees from the start about the respective roles and responsibilities. Sometimes, he finds it helpful to put such arrangements in writing, while recognizing that circumstances and needs can change for certain students. Here are a few areas of enormously importantance for an efficient and successful mentoring, and are discussed below.

- ***Goals***: Ask students to develop and share with me a work plan that includes short-term and long-term goals as well as the timeframe for reaching those goals. Make sure the student's work plan meets the program's requirements and is feasible.
- ***Meetings:*** Tell students how frequently he will be able to meet with them, and that it is their responsibility to arrange and take the lead in these meetings. He lets them know if he has a busy travel schedule due to multiple conferences/meeting or so.
- ***Thresholds***: Be explicit about the kinds of issues if he feels that it requires a face-to-face meeting. Also let students know if they may contact me at home (which is almost always the case due to heavy experiments in his laboratory), and under what circumstances, and ask them their preferences as well.
- ***Assessments***: Discuss how often he will give them an assessment of their general progress, and let them know what type of feedback they can expect from him. Tell them how long it generally takes him to provide a response to their work, and how they can best remind me if they do not hear from him within the specified time.
- ***Drafts***: Discuss his expectations of what first drafts should look like before they are submitted to me. If he does not want students to hand in rough drafts, suggest they share their work first with a trusted peer or post-doctoral researcher, or junior faculty in the group.
- ***Publishing and Presenting***: Share his expectations regarding when and where he would like to see the student give research presentations. Explain the standards and norms for authorship credit in the field, and the extent to which he can assist them with preparing work for submission to journals and conferences.
- ***Intellectual Property***: Before beginning work with students on a project, clarify who owns the data that is being collected, and whether others will have access to it. Also discuss issues of copyright and patent agreements that might occur as a result of a project.

Mentors help students how their objectives fit into the particular graduate degree program, departmental life, and postgraduate options. As the relationship evolves, mentors expect and encourage their students to accept increasing responsibility and more complex challenges. It's essential to keep in mind that the doctoral and master programs are the beginning rather than the sum of the student's career. The mentor's "end game" requires assisting the student in successfully launching that career. Dr. Pradhan makes a particular plan for each student for their career path and guides them carefully onto that path after studying his or her best capability. He implies this for post-doctoral candidates as well. *In particular, mentors need to understand that it is much harder today to find a tenure-track position or even, in many fields, any full-time faculty position. This makes the mentor's guidance, encouragement, networking and promotion of the student more critical than ever. If the relationship is, indeed, lifelong, then opportunities to provide such assistance don't end with the completion of the degree.*

Mentoring benefits students in many ways. It varies according to the needs and interests of the mentees. *Some of the benefits are outlined below:*

- It supports their advancement in research activity, conference presentations, publication, pedagogical skill, and grant-writing as a future researcher.
- Students are less likely to feel ambushed by potential bumps in the road, having been alerted to them, and provided resources for dealing with stressful or difficult periods in their graduate careers.
- The experiences and networks of the mentors help them to improve the students' prospects of securing professional placement.

- The knowledge that someone is committed to their progress, someone who can give them solid advice and be their advocate, can help to lower stress and build confidence in students.
- Constructive interaction with a mentor and participation in collective activities he or she arranges promote engagement in the field.

(b) <u>Dr. Pradhan's mentoring activities to URM students and faculties are above and beyond those expected from other faculties at NSU.</u> This is because of the following reasons:

- ✓ Long experience in working with the graduate students, post-doctoral associates and junior faculties.
- ✓ Having established world-class laboratories which are the gateway for students and faculties for state-of-the-art research and mentoring under his supervision.
- ✓ His research, teaching and dedicated mentoring expertise are very much superior to to any faculties at NSU.

OVERALL OUTCOME: Due to unique mentoring method, there is a significant impact on several major areas of excellence. The most beneficiaries are the **URM** students.

Research Productivity: Most of the Ph.D students publish dozens of papers. Students have very high productivity. Similarly, faculties and research associates mentored by me have published several papers, which helped them getting tenured and promoted. The faculties have developed their own research field and labs under my mentoring.

Career Placement: All graduated students are well placed; many of them are working as Process Engineer in high-tech industries, such as at IBM, INTEL, University facultyetc. Many MS students continue in the Ph. D programs at NSU and at various other Universities.

Career Satisfaction: Every student is highly satisfied due to the nature of the job, such as research and development, and innovation at work.

- ***Commitment:*** *I am committed to open opportunities to women and underrepresented minority faculty or students as demonstrated above.*
- ***Leadership*** *in any capacity that tangibly promotes an environment where diversity is welcomed, fostered, and celebrated and I have demonstrated these at my current University and will continue to do so.*
- ***Participated in creating Ph.D. in Materials Science and Mechanical Eng undergraduate programs*** *that provided support to women and minority faculty.*
- ***Establishing*** *a pipeline in disciplines for students in traditionally <u>URM</u> groups.*
- ***I was instrumental in mentoring*** *students from traditionally underrepresented groups and at-risk students to provide the guidance needed to help ensure their academic experience and promoting funding resources when needed for retention, and to serve as transformative role models for those who may not yet understand their real potential in an academic environment.*
- ***Outreach*** *to members of student clubs, private organizations, or community groups whose mission includes service, education, or extending opportunity to disadvantaged.*

LIST OF RESEARCH PUBLICATIONS

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2. Visual Detection of Denatured Ferritin via Plasmonic Gold Nanoparticle Exposure through an Aminosilane, M. Farrell, R. Reaume, D. Franklins, E. Jenrette, J. Flowers, **A. K. Pradhan**, ***ACS-Omega*** (submitted) 2018.
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48. High temperature ferromagnetism in GaN:Mn thin films, M. Redmond, ***A.K. Pradhan*** et al., MRS-2003.

49. **Invited Talk: Nanoscale magnetism in manganites A.K. Pradhan, North Carolina State University-2004.**

50. Luminescence and spectroscopic behavior of Eu^{3+} doped Y_2O_3 and Lu_2O_3 Nanopowders, ceramics and epitaxial thin films, Mat. Res. Soc. Nov. 29-Dec. 3, 2004 at Boston.

51. Growth and characterization of pulsed laser deposited rare earth-based manganites onto Si (100) semiconductor using $SrTiO_3$ template layer,Mat. Res. Soc. Nov. 29-Dec. 3, 2004 at Boston.

52. Growth optimization and magnetic properties of R (Ba, Sr)MnO/STO/Si Heterostructures, Mat. Res. Soc. Nov. 29-Dec. 3, 2004 at Boston.

53. **Invited Colloquium: Magnetic oxides on semiconductors and dilute magnetic semiconductors for spintronics,** ***A.K. Pradhan***, Department of Physics and Electrical Engineering, Virginia Commonwealth University, Richmond, **March 11, 2005**.

54. Talk: Nanocrystalline materials and Multilayered Films: Research at NSU, A.K. Pradhan, 2005 NSU-ODU Research day exposition at ODU.

55. **Invited Talk: Magnetic oxides semiconductors for spintronics,** ***A.K. Pradhan***, Institute of Physics, India, **June 27, 2005**.

56. **Invited Talk: Dilute ferromagnetic oxide semiconductors- A.K. Pradhan, Magnetism conference at San Jose, California, 2005.**

57. **Invited Colloquium: Multifunctional Magnetic Oxides, Dilute Magnetic Semiconductors and Oxide-based Nanostructures, A.K. Pradhan,** Electrical & Computer Engineering, Old Dominion University, Feb 18, 2006.

58. **Talk:** Ultra-thin Perovskite Manganite films on $SrTiO_3$ and $SrTiO_3$/Si heterostructures, A.K. Pradhan, **APS March Meeting 2006, Baltimore.**

59. Ferromagnetic properties of epitaxial manganite films on $SrTiO_3$/Si heterostructures, D. Hunter, B. Lasley, K. Lord, T.M. Williams, R.R. Rakhimov, A.K. Pradhan, **APS March Meeting 2006, Baltimore**.

60. Growth and characterization of aligned ZnO nanorods**,** T.M. Williams, K. Zhang, D. Hunter, K. Lord and A.K. Pradhan, **APS March Meeting 2006, Baltimore.**

61. **Invited talk: Electrical characteristics of doped ZnO films: A.K. Pradhan, at AVS, California, November 2006.**

62. **Invited Colloquium: Doped ZnO films, A.K. Pradhan,** Electrical & Computer Engineering, Old Dominion University, **November 2006.**

63. **Invited talk: Growth and characterizations of doped ZnO films, A.K. Pradhan, SPIE, San Jose, California, January, 2007.**
64. **Invited Colloquium: Multifunctional Magnetic Oxides and doped Semiconductors, A.K. Pradhan,** Materials Science & Engineering, Virginia Tech., **February 23, 2007.**
65. **Invited Talk**: Synthesis and magnetic characterizations of manganite-based composite nanoparticles for biomedical applications, **A.K. Pradhan, 52 Int. Nat. Conf. MMM, Nov. 2007, Tampa, Florida.**
66. Poster: LSMO\PZT\LSMO (Co) Magnetic Tunnel Junctions, R. Mundle, A.K. Pradhan, **52 Int. Nat. Conf. MMM, Nov. 2007, Tampa, Florida.**
67. Poster: Er:ZnO Films For Electroluminescent Devices With Emission Of 1.54 micro meter, R. Mundle, A.K. Pradhan, Virginia State Library, Richmond, April, 2007.
68. Poster: Er:ZnO Films For Electroluminescent Devices With Emission of 1.54 micro meter, R. Mundle, A.K. Pradhan, NSU-ODU Research Expo-2007.
69. **Oral**: Enhanced optical response and photocurrent in CdSe semiconductor via surface plasmon excitation in gold nanoparticles, R. Mundle, A.K. Pradhan HBCUs /OMUs Research Conference, NASA Glenn Research Center, August 28, 2007.
70. Poster: Enhanced optical response in CdSe semiconductor via surface plasmon excitation in Gold nanoparticles, R.B. Konda, R. Mundle, H. Mustafa, O. Bamiduro and A.K. Pradhan, Am. Vac. Soc., Seattle, WA, Oct. 2007.
71. **Oral:** Metallic Conductivity in Transparent Al:ZnO Films, O. Bamiduro, H. Mustafa, R. Mundle, R. B. Konda, and A.K. Pradhan, Am. Vac. Soc., Seattle, WA, Oct. 2007.
72. Poster: Er:ZnO Films For Electroluminescent Devices With Emission of 1.54 micro meter, R. Mundle, A.K. Pradhan, Virginia State Library, Richmond, April, 2007.
73. **Invited Talk: SPIE-** 2008, Surface Plasmon Excitation via Au Nanoparticles in CdSe Semiconductor**, San Diego**
74. **Invited Talk:SPIE**- 2008, Synthesis and photoluminescence properties of Er-ZnO, **San Diego**
75. Nanoelectronics for RF and Electronics Applications, DARPA-ARL-AMRDEC Workshop, 28 – 29 August 2008, Adelphi, MD 20783.
76. Synthesis and Magnetic Characterizations of Manganite-Based Composite Nanoparticles for Biomedical Applications, R. Bah, K.Zhang, T. Holloway, R. B. Konda, R. Mundle, H. Mustafa, R. R. Rakhimov, and A. K. Pradhan, Nanotech 2008 (June 1-5), Boston.
77. Magnetic Tunnel Junctions using piezoelectric material as a barrier, R. Mundle, A.K. Pradhan, **53 Int. Nat. Conf. MMM, Nov. 2008, Austin, Texas.**
78. **Invited talk:** Synthesis and magnetic characterizations of FeCo nanoparticles for biomedical applications, K. Zhang, H. Holloway, A.K. Pradhan, et al., **53 Int. Nat. Conf. MMM, Nov. 2008, Austin, Texas.**
79. Ultra-Violet Radiation Sensing in Composite Oxide Semiconductor Films, R. B. Konda, R. Mundle, G. Kogo, O. Bamiduro, O. Yasar, W. Moore, K. Zhang, M. Bahoura, F. Williams and **A.K. Pradhan, MRS, Boston, 2008.**
80. FeCo nanoparticles with different alloy composition, K. Zhang, H. Holloway, A.K. Pradhan, et al., **MRS, Boston, 2008.**
81. **Invited:** Synthesis and magnetic characterizations of Eu-doped Gd_2O_3 and FeCo nanoparticles for biomedical applications, A.K. Pradhan, SPIE, Smart materials, San Diego, March 2009.
82. **HBCU-NSF-RISE** Research Prog. A.K. Pradhan, JAM 2009, Washington DC, June 8-11.
83. **Invited:** Environmental Sensing in Composite Oxide Semiconductor Films, A.K. Pradhan, R. Mundle, G. Kogo, R. B. Konda, O. Bamiduro, O. Yasar, M. Bahoura, F. Williams and K. Song, SPIE, Smart materials, San Diego, March 2010.

84. Growth and properties of PZT -based perovskite multilayers for sensor applications, A.K. Pradhan, O. Yasar, R. B. Konda, R. Mundle, M. Bahoura, F. Williams, K. Song, and D.R. Sahu SPIE, Smart materials, San Diego, March 2010.
85. Synthesis and characterization of composite of gold nanoparticles attached ZnO nanorods**,** K. Zhang, R. Konda, T. Holloway, W. Cao, A. K. Pradhan, SPIE, Smart materials, San Diego, March 2010.
86. **INTERNATIONAL TALK SERIES:** 2nd Meeting on the Thematic Network of Complex Materiales and Nanostructures" during 24th - 26th November, 2010: (a) Synthesis and characterization of oxide-based nanomaterials for biomedical applications Magnetic nanomaterials for biotechnology, (b) Magnetic nanomaterials for biotechnology.
87. Better Than Gold: Plasmonic Materials for Telecom Wavelengths, M. A. Noginov, Lei. Gu, J. Livenere, G. Zhu, A. K. Pradhan, R. Munde, M. Bahoura, CLEO, 2010.
88. **Invited Talk:** Nanocrytalline Chalcopyrite CIGS thin films for high-performance photovoltaic application, A.K. Pradhan, SPIE, Smart materials, San Diego, March 2011.
89. **NSF-CREST-RISE** Research Prog. A.K. Pradhan, JAM 2011, Washington DC, June 8-11.
90. G. Chennamadhava, O. Bamiduro, M. Bahoura and A.K. Pradhan, Electro-deposited $CuIn_{1-x}Ga_xSe_2$ thin films for high-performance solar cells, REIS Conference, International Conference on Applications of Renewable & Sustainable Energy December 16-18, 2010, Dept. of Physics, Osmania University, India.
91. NANOSTRUCTURED ELECTRO-DEPOSITED $CuIn_{1-x}Ga_xSe_2$ CHALCOPYRITE THIN FILMS FOR HIGH-PERFORMANCE SOLAR CELLS, G. Chennamadhava, O. Bamiduro, M. Bahoura and A.K. Pradhan, MRS, San Francisco, May 23-29, 2011.
92. DoD HBCU/MI conference in Atlanta, March 2011.
93. DoD Centers of Excellence Kickoff Meeting, September, 2011
94. MRSEC Shared Facilities Management Workshop, Wildcat Room, Norris 101, Northwestern University, November 1, 2011.
95. Native Oxides Reduction of GaAs by Atomic Layer Deposition Technique, R.B. Konda, R. Mundle, H. Dondapati, C. Samantaray, M. Bahoura, and A.K. Pradhan, "Workshop on Frontier Electronics (WOFE-2011)" San Juan, Puerto Rico, 18-21 December 2011.
96. **Invited:** Nanostructured Materials for Multifunctional Applications under NSF-CREST Research at Norfolk State University, March, SPIE, Smart materials, 2012, San Diego.
97. Remarkable evolution of electrical conductivity in Al:ZnO films, H. Dondapati, A.K. Pradhan, March, SPIE, Smart materials, 2012, San Diego.
98. Magnetic and optical properties of $CoFe_2O_4$/ZnO core-shell nanocomposites, K. Zhang, A.K. Pradhan, March, SPIE, Smart materials, 2012, San Diego.
99. **Invited Talk**: Nanostructured materials for multifunctional applications under NSF-CREST research at Norfolk State University, March, SPIE, Smart materials, 2012, San Diego.
100. Al-doped ZnO aligned nanorod arrays opto-electronic and sensor applications**,** Terence Holloway, Rajeh Mundle, Hareesh Dondapati, R.B. Konda, M. Bahoura, and A. K. Pradhan, March, SPIE, Smart materials, 2012, San Diego.
101. Design of Nanostructured-based Glucose Biosensors**,** Archana Komirisetty, Frances Williams, Aswini Pradhan, Rajini Babu Konda, Hareesh**,** Dondapati, and Diptirani Samantaray, March, SPIE, Smart materials, 2012, San Diego.

102. Talk: Synthesis and characterization of lithium ion batteries, A.K. Pradhan, K. Zhang, R. Mundle, M. Arslan, O. Amponsah, and M. Bahoura, March, SPIE, Smart materials, 2012, San Diego.
103. 1D ZnO nanoarray using Electron beam lithography (EBL), A.K. Pradhan, M. Arslan, et al., MRS, Nov. 25-30, 2012, Boston, USA,
104. Nanostructure patterning of functional oxide thin films by electron beam lithography with HSQ patterned templates, Brandon Walker, Casey Gonder, Gari Romain, Bo Xiao and A.K. Pradhan, MRS, Nov. 25-30, 2012, Boston, USA.
105. Mechanical Properties of Multilayer UltraThin Films of BTO/LSMO on STO and **LaO,** Sha'La Fletcher, Brandon Walker, Casey Gonder, R.M. Mundle, M. Bahoura and A.K. Pradhan, MRS, Nov. 25-30, 2012, Boston, USA.
106. Electrical Properties of Mo thin films for Bottom contacts for CIGS solar cell, O. Bamiduro and A.K. Pradhan, MRS, Nov. 25-30, 2012, Boston, USA.
107. **Invited Talk**: Electrical Conductivity and Photo-Resistance of Atomic Layer Deposited Al-doped ZnO Films, A.K. Pradhan, R. Mundle, MRS, Nov. 25-30, 2012, Boston, USA.
108. Electrical Properties of ZrO_2/GaAs for Innovative electronics, R.B. Konda and A.K. Pradhan, MRS, Nov. 25-30, 2012, Boston, USA.
109. **Invited Talk**: 17th natioanl Seminar on Ferroelectrcs & Dielectrics, ITER, BBSR, Dec. 17-19, 2012 India.
110. 1D ZnO nanoarray using electron-beam lithography, A.K. Pradhan et al., Nano-, Bio-, Info-Tech Sensors and Systems, SPIE, 10 March 2013 to 14 March 2013 in San Diego, California USA.
111. Atomic layer deposited Al-doped ZnO films for optoelectronic applications , A.K. Pradhan et al., Nano-, Bio-Info-Tech Sensors and Systems, SPIE, 10 March 2013 to 14 March 2013 in San Diego, California USA.
112. High-k dielectrics in II-V semiconductors for innovative electronics, , A.K. Pradhan et al., Nano-, Bio-, Info-Tech Sensors and Systems, SPIE, 10 March 2013 to 14 March 2013 in San Diego, California USA.
113. The Effect of Growth Temperature and Thickness of Hafnium Oxide by Atomic Layer Deposition in CMOS Devices, Donovan Thomas, Curtis White, A.K. Pradhan, MRS, April. 1-5, 2013, San Francisco, USA.
114. Zirconium-aluminate high-k on GaAs by Atomic Layer Deposition, Curtis White, Donovan Thomas, Q. Yang, A.K. Pradhan, MRS, April. 1-5, 2013, San Francisco, USA.
115. CdSe Quantum Dot based FET, H. Dondapati, Duc Ha, and A.K. Pradhan, MRS, April. 1-5, 2013, San Francisco, USA.
116. ZnO-nanorod arrays based inorganic-organic hybrid photovoltaics, M. Arslan, H. Dondapati, R. Mundle, and A.K. Pradhan, MRS, April. 1-5, 2013, San Francisco, USA.
117. **Distinguished Invited Speaker**--Self-Assembly of Nanostructures On Electron Beam Lithographically Patterned Templates for Biomedical and Nanoelectronic Sensor Applications; AK Pradhan, 224th ECS Meeting (October 27–November 1, 2013).

118. Self-Cleaning and Electrical Characteristics of ZrO2/HfO2/GaAs MOS Capacitor Fabricated by Atomic Layer Deposition A.K. Pradhan, Curtis white, 224th ECS Meeting (October 27–November 1, 2013).
119. Vapor-Solid Growth of Highly Oriented SnO2 Nanorods for Chemical Sensing Applications, CG Carvajal, CS Davis, AK Pradhan, 224th ECS Meeting (October 27–November 1, 2013).
120. Resistive Switching Devices Based on Ozone assisted ZnO Films by Atomic Layer deposition, R.M. Mundle and A.K. Pradhan, AVS 60th International Symposium, October 27 through November 1, 2013 in Long Beach, CA, USA.
121. (Invited) DNA Assembly on Nanopatterns Created by Electron Beam Lithography, T. Birdsong and A.K. Pradhan, AVS 60th International Symposium, October 27 through November 1, 2013 in Long Beach, CA, USA.
122. Multilayered metamaterial based on metal-dielectric for nanoscale emitters, S.K. Pradhan, R. Mundle, J.R. Skuza, B. Xiao, and A.K. Pradhan, MRS, Dec. 2-6, 2013, Bsoton, USA.
123. Extreme tunability of Al:ZnO infrared Plasmonic multilayers Metamaterial for telecommunication applications, A.K. Pradhan, Kevin Santiago, R.M. Mundle, H. Dondapati, J.R. Skuza, Bo Xiao, and K. Song, MRS, Dec. 2-6, 2013, Bsoton, USA.
124. High-performance chemical-bath deposited CdS thin-film transistors with ZrO_2 gate dielectric, Hareesh Dondapati, and A. K. Pradhan, MRS, March, 2014, Bsoton, San Francisco.
125. (Invited) Frequency Dispersion and Band Alignments in ZrO_2-GaAs Mos Capacitor Using Self Cleaned GaAs Substrates By Atomic Layer Deposition, A.K. Pradhan, 225th ECS Meeting (May 11-15, 2014).
126. Capacitive dependence on the thickness of silicon dioxide films grown by Atomic Layer deposition on silicon substrates using Tris (Dimethyl Amino) Silane (TDMAS) and Ozone, EK Tanyi, SK Pradhan, A Pradhan, Bulletin of the Am. Physical Soc. 59, 2014.
127. **Invited Talk**: Nanotechnology and beyond, Aswini Pradhan, Institute of Materials, BBSR, Jan7 2015.
128. **Key Note Speaker: SPIE, Smart Materials &NDE, March 8-12, 2015, San Diego,** Nanomaterials & Nanotechnology for various Applications: Biotechnology to Energy, **Aswini Pradhan**
129. **Invited Talk: II-VI Quantum-dot based Semiconductor Thin Films and Devices for Optoelectronic Applications**, Aswini Pradhan, MRS conference, April 6-10, 2015, San Francisco, CA.
130. **CdTe Quantum-dot based Solar cells**, Lumu Manandhar & Aswini Pradhan, MRS conference, April 6-10, 2015, San Francisco, CA.
131. A New Kind of SERS Active Substrate Using a Film of Densely Packed Gold Nanoparticles, G Rutherford, M Farrell, B Xiao, CG Carvajal, K Santiago, AK Pradhan, ECS, Chicago, 2015, Meeting Abstracts, 2125-2125, 2015
132. Photochemical Decoration of Metal/Metal-Oxide Nanoparticles on SnO2 Nanorods for Improved Hybrid Gas Sensors and Photodetectors for Environmental Applications, CG Carvajal, K Kadri, G Rutherford, AK Pradhan, ECS, Chicago, 2015, Meeting Abstracts, 2143-2143, 2015
133. (Invited) Using Nanotechnology for Biosensor Applications, F Williams, A Komirisetty, D Baker, AK Pradhan, ECS, Chicago, 2015, Meeting Abstracts, 1884-1884, 2015
134. Effects of 3-Aminopropyl Triethoxysilane (APTES) on Stability, Optical Properties and Morphology of Gold Nanoparticles, M Farrell, G Rutherford, AK Pradhan, ECS, Chicago, 2015, Meeting Abstracts, 2279-2279, 2015
135. (Invited) Artificially Tailored Plasmonic Nanostructures for High-Performance Biosensing Devices, AK Pradhan, ECS, Chicago, 2015, Meeting Abstracts, 2101-2101.

136. (Colloquium) Artificially Nanostructures for health and energy applications, October 2015, at Electrical Engineering Department, Texas Tech. University.

137. (**Invited**) Plasmonic Nanostructures for Biosensing, AK Pradhan, SPIE/OSJ Biophotonics, **A.K. Pradhan**, Tokyo, Japan, October 27, 2015.
138. (**Invited**) Nanostructures for health and energy applications, **A.K. Pradhan, WOFE-2015**, Dec. 15-18, San Juan, Puerto Rico.
139. **Distinguished Seminar: "Nanotechnology for Preventative Health Care and Energy"** 310 Kelly Hall (Hosted by Prof. Tim Long), March 9, 2016, Virginia Tech.
140. (**Invited**) Graphene Oxide and ZnO/Al: ZnO Based **A Pradhan**, PRiME 2016/230th ECS Meeting, Honolulu (October 2-7, 2016).
141. Visual Detection of Denatured Ferritin via Plasmonic Au Nanoparticle Exposure through an Aminosilane, M. Farrell, **A Pradhan**, PRiME 2016/230th ECS Meeting Honolulu (Oct. 2-7).
142. Plasmonic Nanostructures for High-Performance Biosensing Devices, A Pradhan PRiME 2016/230th ECS Meeting Honolulu (October 2-7, 2016).
143. Microwave synthesized CdSe-ZnO core-shell quantum dots as a biosensing platform for protein detection, E. Jenrette, M. Farrell, J. Flowers, S. Skuza and A.K. Pradhan, PRiME 2016/230th ECS Meeting Honolulu (October 2-7, 2016).
144. The Study of Self-Assembled Au Nanoparticles as an Efficient SERS Substrate for Environmental Sensing Applications; Jasmin Flowers, G. Rutherford, M. Farrell, Jonathan Skuza, C. Carvajal, Erin Jenrette, & Aswini Pradhan; PRiME 2016/230th ECS Meeting.
145. Solid-State Flexible Super-Capacitors Fabricated by Elecrochemical Deposition, MRS, Boston, Nov 29, 2016, Curtis White, S. Pradhan , **Aswini Pradhan**.
146. **(Invited)** Artificial Nanostructures for Multifunctional Sensing Devices, MRS, (Phonix) **Apr 20, 2017 - Aswini Pradhan**.
147. **(Invited)** Electro-Thermal Control of Vanadium Dioxide Multilayered Thin Film Phase Change Material by Degenerate Semiconductor for Smart-Device Applications, **Apr 21, 2017 MRS (Phoenix) Aswini Pradhan** & Jonathan Skuza
148. Thermoelectric Properties of Molybdenum Disulfide (MoS_2) with Noble Metal Doping Apr 19, 2017 **MRS (Phoenix)**, Gilbert Kogo and **Aswini Pradhan**.
149. Investigation of Ferroelectric Behavior in Doped Hafnium Oxide Apr 19, 2017 **MRS (Phoenix)** Irving Cashwell , **Aswini Pradhan** , Bo Xiao
150. Multifunctional Properties of Highly c-Axis Oriented NZFO Thin Films Apr 20, 2017 **MRS (Phoenix)**, D. Pradhan, S. Kumari, **Aswini Pradhan**, Ram Katiyar.
151. Probing the Tip Induced Polarization Switching and Magnetoelectric Coupling in PFN/NZFO/PFN Heteterostructure at Room Temperature, Apr 19, 2017 **MRS (Phoenix)**, D. Pradhan , S. Kumari , R. Vasudevan , A.K Pradhan , S. Kalinin, R. Katiyar.
152. Evaluation of ZnO: Al as a contact material to CdZnTe for radiation detector applications, UN Roy, GS Camarda, RB James, **A.K. Pradhan**, *SPIE, 2017 Optical Engineering+ Applications*, 99680O-1.
153. **Distinguished Speaker Seminar Series** at Virginia Commonwealth University's Department of Mechanical and Nuclear Engineering: ***Nanotechnology for biomedical diagnostics, sensing and energy applications***, September 22, 2017.

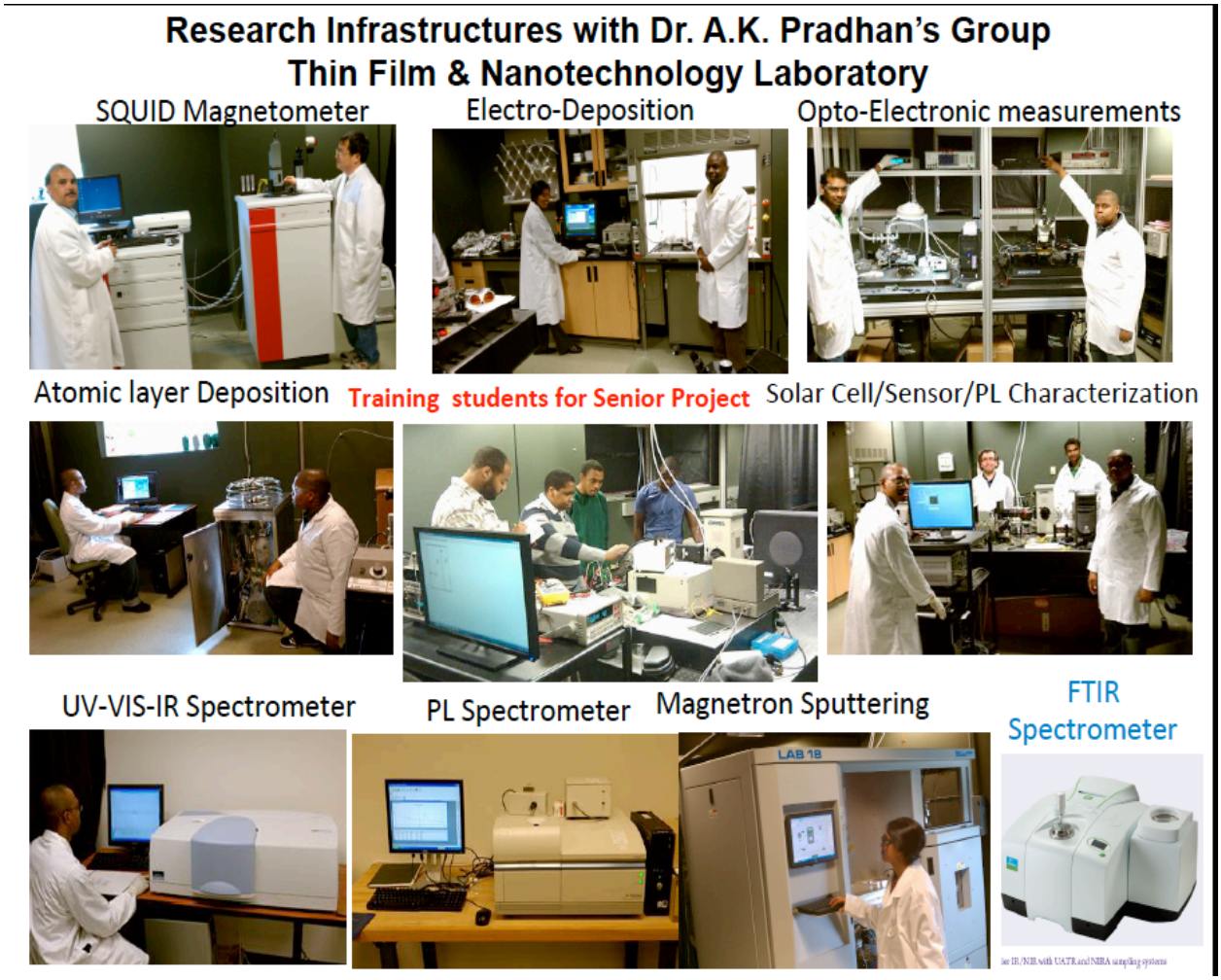
Laboratory Facilities Established and Used:

The current laboratory established by Dr. Pradhan contains many state-of-the-art equipment and facilities, including:

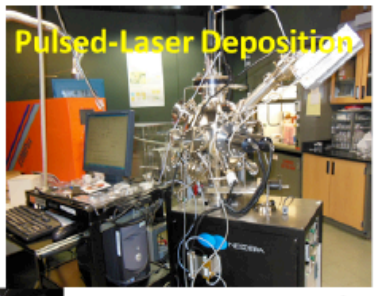
(a) Growth/Synthesis: Pulsed-laser deposition (PLD), Atomic Layer Depositions (ALD), RF and DC sputtering, E-beam and thermal evaporation systems, Blue Wave CVD system, Electro deposition, PE-ALD (Savana and Angstrom), Vacuum furnace, Isostatic Press, Microwave synthesizers, RTP, Plasma Etcher and Chemical labs with glove box for nanomaterials synthesis, furnaces, Ball milling, Centrifuge etc.

(b) Characterization and Nano-Fabrication: QD-SQUID Magnetometer, Bruker Dimension AFM, Raith (Pioneer) Electro-Beam Lithography system, Hitachi FE-SEM with EDAX and STEM (Hitachi), TEM (Hitachi), Horiba Micro-Raman and PL (Evolution), Electrical: IV, CV, PE measurements, UV-VIS-IR Perkin-Elmer) and Fluorescence Spectrophotometers (Hitachi), Confocal Fluorescence Microscope, PL for wide band gap semiconductors down to 10K, Solar cell and spectral Characterization systems, Li-ion Battery synthesis & Testing, XRD (Pan Analytic & Rigaku), JEOL LV-SEM, Zeta Potential, Ion Milling, Profilometer, Thermo-electric measurement system (MMR) down to 80K.

(a) Computation: The lab contains advanced computational tools for modeling, simulation (Materials Studio, COMSOL etc.).



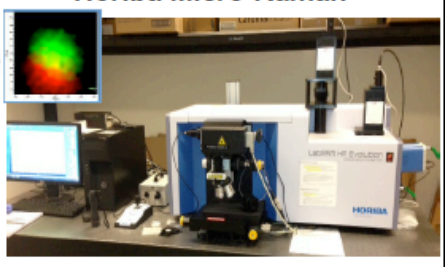
Research Infrastructures with Dr. A.K. Pradhan's Group
Thin Film & Nanotechnology Laboratory



Electron Beam Lithography

Plasma Etch

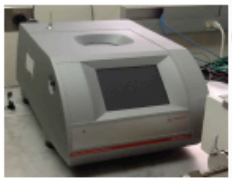
Horiba Micro-Raman



Hitachi- TEM

Atomic Force Microscope

Micro-Wave Synthesizer



RTP

Paylane Coater

FE-SEM/EDAX/STEM