Curriculum Vitae

Dr. Amit Kumar Gangwar (Ph.D.)

Post Doctoral Research
Department of Chemical Engineering, Biotechnology and Materials (FCFM), University of Chile, Santiago, Chile
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Project details:

Millennium nucleus of Advanced MXenes for sustainable Applications

Period of stay: July 2024 - July 2027

Academic Qualifications:

Ph.D. in Physics (2024)
Academy of Scientific and Innovative Research
CSIR-National Physical Laboratory, New Delhi, India

M.Sc. in Physics with a specialization in electronics (2016)
M.J.P. Rohilkhand University Bareilly, India

B.Sc. in Physics, Chemistry, and Mathematics (2014)
M.J.P. Rohilkhand University Bareilly, India

12th U.P. Board, Allahabad, India (2011)

10th U.P. Board, Allahabad, India (2009)

Research Experience & Technical Skills:

Synthesis, characterization and applications of nanostructured thin films of advanced functional materials.

- Synthesis: DC/RF magnetron sputtering, Thermal Evaporation, and CVD.
- Applications: Gas sensors, Energy storage, Flexible devices, photodetector.

I am actively engaged in the development of MXenes and metal oxide-based gas sensors by employing DC and RF magnetron sputtering. Among metal oxide-based gas sensors, mainly I engaged with SnO2-based gas sensors, and to improve its sensitivity we are depositing a thin layer of Pd, Pt, Au and CdTe. Some improved results of this hybrid structure have been published. The extension of this work is ongoing. Moreover, I am well experienced in independently handling the following synthesis and characterization technique

- **Material Synthesis**: DC/RF magnetron sputtering, Thermal Evaporation, and CVD technique.
- **Structural Characterization:** X-ray Diffraction (XRD; Rigaku), FESEM (Field Emission Scanning Electron Microscope), Transmission electron microscopy (TEM), Atomic force microscopy (AFM), Energy dispersive X-ray spectroscopy (EDX), X-ray photoelectron spectroscopy (XPS), UV-Vis-NIR spectrophotometer, Photoluminescence (PL) spectroscopy, Contact angle goniometry measurement, and Electrical transport measurements (resistivity and dielectric), Hall effect and Ellipsometry measurement.
- **Computational Knowledge:** Basic knowledge of Windows MS Office, Origin, Rietveld Refinement Foolproof, COMSOL Software, Linux and Partial knowledge of MATLAB programming and Lab view Programming.
- Vacuum Systems Maintenance: Rotary, Turbo molecular, and Ion pumps.
- Thermal & E-beam Deposition: Deposition of Ag, Al, Pt for electrical contacts.
- Hands-on experience in gas sensing Setup (Design, installation and maintenance) and gas sensing Measurements (CO, NO_X, H_2, H_2S, C_2H_5OH, VOCs gas)
- Hands-on experience in sputtering System (DC/RF): Design, installation and maintenance.

National Level Achievements:

- **NET-JRF** (Physical Sciences) in Dec, 2017.
- Senior Research Fellowship (**SRF**) – January 2021.

Other Achievements:

Best Poster Award- 4th International Conference on Recent Advances in Science (ICRAS-2020) held at Invertis University, Bareilly, UP, India during February 28-29, 2020.

Silver Prize Poster Award - International Conference on Frontiers in Materials for Technological Applications (FIMTA-2022) organized by CSIR-institute of Minerals and Materials Technology, Bhubaneswar - 751013 during August 03-05, 2022.

Young Scientist Award given by (**SERB)** Department of Science and Technology, Indiato participate in **19th International Conference on Thin Films (ICTF 2023)** organized by the Spanish Vacuum Society (ASEVA) in Burgos (Spain) September 26- 29th, 2023.

Publications in SCI Journals:

1. Magnetron configurations dependent surface properties of SnO_2 thin films deposited by sputtering process, **AK Gangwar**, R Godiwal, J Jaiswal, V Baloria, P Pal, G Gupta, P Singh, **Vacuum 177 (2020) 109353**.
2. Preparation of nanocrystal line Pd/SnO2 thin films deposited on alumina substrate by reactive magnetron sputtering for efficient CO gas sensing, **AK Gangwar,** R Godiwal, S. Srivastava, P Pal, G Gupta, P Singh, **Mater. Res. Bull. 148 (2022) 111692.**
3. Influence of magnetron configurations on the structure and properties of room temperature sputtered ZnO thin films, R Godiwal, **AK Gangwar**, J Jaiswal, P Vashishtha, M Hossain P Pal, G Gupta, P Singh, **Physica Scripta 96 (2021) 015811.**

4. Room temperature sputtered nanocrystalline SnO_2 thin film sensitized with Pd nanoparticles for high-performance CO gas sensing application
   AK Gangwar, S. Srivastava, R Godiwal, J Jaiswal, P. Vashishtha, S. Pal, P Pal, G Gupta, P Singh, **Optical Materials 128 (2022) 112362**.
5. Effect of shock wave on optical properties of Propyl p-hydroxybenzoate single crystal: A self-defocusing third order nonlinear optical material, D. Nayak, N. Vijayan, Manju Kumari, P Vashishtha, S. K. Saini, **AK Gangwar**, G Gupta, R.P. Pant, **Journal of Physics and Chemistry of Solids 167 (2022) 110768**.
6. Study of birefringence inside nanocrystalline Zinc Oxide thin films using terahertz spectroscopy, R Godiwal, S Nimanpure, G Singh, **AK Gangwar**, AK Verma, D Roychowdhury, P Singh, M Jewariya, **Optical Materials 133 (2022) 112962.**
7. Effect of shock wave on surface morphology and optical properties of acid phthalate based single crystals, M Kumari, N Vijayan, D Nayak, Kiran, P Vashishtha, **AK Gangwar,** G Gupta, P Singh, RP Pant, **Optical Materials Volume 133, November 2022, 112986.**
8. Strong light-matter interaction and antireflection functionality of f-TiO2/GaN heterostructure broadband photodetector, P Vashishtha, R Tanwar, P Prajapat, **AK Gangwar**, L. Goswami, P Singh, J Tawale, N Dilawar, G Gupta, **J. Alloys Compd. Volume 948**, **5 July 2023, 169735.**
9. Investigating the properties of nickel oxide thin films prepared via DC reactive magnetron sputtering for potential application in gas sensing S Srivastava, **AK Gangwar**, R Godiwal, G Gupta, P Singh, **Mater. Today. Proc 2023**.
10. Room temperature RF magnetron sputtered nanocrystalline NiO thin films for highly responsive and selective H_2S gas sensing at low ppm concentrations, S Srivastava, **AK Gangwar**, A Kumar, G Gupta, P Singh, **Mater. Res. Bull. 165 (2023) 112330.**
11. Fabrication of Two-Dimensional MoS2 Thin Film Using Chemical Vapor Deposition (CVD) for Gas Sensing Application, P Berwal, P Singh, S Rani, S Sihag, S Kumar, A Jatrana, **AK Gangwar**, V Kumar, **Recent Advances in Nanotechnology Volume 28, 403–408, 2023**.
12. Strain induced photocurrent enhancement in thin films of topological insulators (Bi2Te3) A Pandey, S Sharma, **AK Gangwar**, M Kaur, P Singh, S Husale, **J. Mater. Chem. C, 2023**.
13. Highly efficient, self-powered, and air-stable broadband photodetector based on SnSe thin film, P Vashishtha, P Goswami, P Prajapat, **AK Gangwar**, P Singh, G Gupta, **J. Alloys Compd. Volume 948**, **5 July 2023, 169735**.
14. Synthesis and growth mechanism of ZnO nano candles using thermal evaporation and their efficient CO sensing performance, R Godiwal, **AK Gangwar** , AK Verma , P Vashishtha, A Kumar , V Chawla , G Gupta , P Singh, **Micro and Nanostructures, 184 (2023) 207692.**
15. Fabrication of Two-Dimensional MOS_2 Thin Film Using Chemical Vapor Deposition (CVD) for Gas Sensing Application, P Berwal, P Singh, S Rani, S Sihag, S Kumar, A Jatrana, **AK Gangwar** ,V Kumar, Recent Advances in Nanotechnology **Volume 28**, **8 September, 2023.**
16. Magnetron configurations dependent room temperature sputtered ZnO thin films for highly responsive, stable, and selective CO gas sensing, R. Godiwal, **AK Gangwar**, P. Singh**, Mater. Lett., 357 (2024) 135787.**

17. Low-temperature operable and high performing Pd-ZnO thin films sputtered at room temperature for ultrafast detection of CO gas, R. Godiwal, AK. Gangwar, **A. Kumar**, G. Gupta, P. Singh, **Opt. Mater. 148 (2024) 114919.**

18. Temperature-dependent p-n switching for highly selective CO gas sensing based on mixed phases of magnetron sputtered (p)SnO-(n)SnO_2 thin film
AK Gangwar, R Godiwal, U Varshney, S Das, JS Tawalec, G Gupta, P Singh,Appl. Surf. Sci.
Volume 655, 15 May 2024, 159607.

Conference/ Seminar/Workshop:

1. Effect of magnetron configuration on the surface properties of SnO_2 thin films deposited using balanced and unbalanced magnetron sputtering, AK Gangwar, R Godiwal, J Jaiswal,V Baloria, P Pal, G Gupta, P Singh
4th International Conference on Recent Advances in Science (ICRAS-2020) held at Invertis University, Bareilly, UP, India during February 28-29, 2020. (Poster Presentation)
2. Study on the structural, optical and wettable properties of ZnO thin films deposited at room temperature under balanced and unbalanced magnetron sputtering, R Godiwal, AK Gangwar, J Jaiswal, G Gupta, P Singh (Poster Presentation)
4th International Conference on Recent Advances in Science (ICRAS-2020) held at Invertis University, Bareilly, UP, India during February 28-29, 2020.
3. **International E-Conference on Recent Advances in Physics: A Promise to Society (IC-RAPPS) 2020**, Govt pg college, Bazpur, Uttarakhand ,24-25 June 2020.
4. **International E- Conference on New Frontiers in science and technology** held at Research institute of science and technology Manipur university campus, July 9-11 ,2020.
5. **International e-Conference on "Material Science and Technology - 2020"**, Organized by KLE Society's S. Nijalingappa College, Bangalore, India on 9th & 10th October 2020.
6. **Virtual symposium on recent technological advancement in Wide /Ultra-wide Bandgap Semiconductor Materials, Devices and applications** held on 10 April, 2021 at BITS Pilani Campus.
7. **Energetic Beam Technology: From Materials Engineering to Diagnostics,** held on June 21 -25, 2021, organized by Amity institute of nanotechnology Amity University, U P, Noida, UP – 201313, INDIA
8. **International Symposium on History and Future of Transistors** held on December29,2021 Jointly organized by The National Academy of Sciences India-Delhi Chapter, Deen Dayal Upadhyaya College (University of Delhi) under the aegis of DBT Star College Program IEEE Electron Device Society (EDS) Delhi , India.
9. **National Conference of Science Communication & Science Teachers in Indian Independence Movements &the Role of Science** held on November 29-30 ,2021.
10. **Virtual Mini Colloquia (MQ) on "75th Anniversary of Transistor Invention"** held on August 26, 2022 **Organized by IEEE EDS Delhi Chapter (New Delhi India).**
11. **2nd International Conference on "Sustainable Materials and Technologies for Bio and Energy Applications SMTBEA-2022**", held on 15th, July 2022 Organized by SSN Institutions, Kalavakkam, Chennai-603110, in association with Elavenil Science Association & Indian Science and Technology Association.

12. **Highly sensitive and selective CO gas sensor based on nanocrystalline Pd/SnO2 thin film prepared by magnetron sputtering technique, AK Gangwar,** R Godiwal, P Singh **International Conference on Frontiers in Materials for Technological Applications (FIMTA-2022)** organized by CSIR-institute of Minerals and Materials Technology, Bhubaneswar - 751013 during August 03-05, 2022. (Poster Presentation)
13. **Study of the properties of Nickel oxide thin film grown by RF magnetron sputtering for gas sensing devices,** S. Srivastava, **AK Gangwar,** R Godiwal, P Singh, **International Conference on Frontiers in Materials for Technological Applications (FIMTA-2022)** organized by CSIR-institute of Minerals and Materials Technology, Bhubaneswar - 751013 during August 03-05, 2022. (Poster Presentation)
14. **Effect of balanced and unbalanced magnetron sputtering on the structural, optical and wettable properties of ZnO thin films deposited at room temperature,** R Godiwal, **AK Gangwar,** P Singh, **International Conference on Frontiers in Materials for Technological Applications (FIMTA-2022)** organized by CSIR-institute of Minerals and Materials Technology, Bhubaneswar - 751013 during August 03-05, 2022. (Poster Presentation)
15. **Temperature-Dependent p-n Switching of Extremely Selective CO Gas Sensor Based on p-SnO/n-SnO_2 Heterojunction thin film, AK Gangwar,** R Godiwal, P Singh **Nineteenth International Conference on Thin Films (ICTF 2023)** organized by organized by the Spanish Vacuum Society (ASEVA) in Burgos (Spain) September 26- 29th, 2023. (Poster Presentation)

Personal Information:

- **Name:** Amit Kumar Gangwar
- **Date of Birth:** 2 Jan 1995
- **Nationality:** Indian
- **Gender:** Male
- **Marital Status:** Single
- **Languages:** English, Hindi, Spanish

Declaration:

I hereby declare that the details stated above are true and correct to the best of my knowledge.

(Amit Kumar Gangwar)