

Dr. Amanpal Singh Clair



Personal

Date of Birth: July 14, 1982
Place of Birth: Rajasthan, India
Marital Status: Single
Gender: Male
Family: Jat Sikh

Contact

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Department of Physics,
University of Rajasthan, Jaipur
Jaipur-302004,
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Jaipur-302004
Rajasthan, India

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Research Interest

- ZnO Quantum Well LEDs and FET.
- Graphene Oxide and Graphene Film Deposition for modern electronic Devices.
- Organic LED and Organic Solar Cell.
- Green Energy Technologies.
- Semiconductor nanostructures: Growth, characterization and nano-devices.
- Semiconductor materials, processing and devices.
- Wide band gap semiconductors and devices.
- Characterization of defects in semiconductors,
- Thin films and Nano-wires deposition and characterization.

Microelectronic Skills

- Wafer cleaning and handling,
- Oxidation/ Diffusion
- Photolithography,
- Etching,
- Metallization,
- Thin films deposition (PVD and CVD),
- p-njunctions and MOS/MIS fabrication.

Materials Characterization Skills

- Resistivity measurement (Four probe, Van der Pauw),
- C-V, I-V characterization by Keithley 590 CV analyzer, 4200 SCS and 2602 Systems,
- Characterization of semiconductors by Hall effect,
- UV-VIS- NIR spectroscopy; Absorbance, Transmission and Reflectance mode
- Photoluminescence spectroscopy and mapping
- Surface characterization by Atomic Force Microscopy (AFM),
- Energy Dispersive X-ray Spectroscopy (EDS),
- X-ray Diffraction and high resolution X-Ray Diffraction Spectroscopy,
- X- Ray Absorbance Spectroscopy (NEXAFS),
- Raman Spectroscopy,
- RT-66A standardized ferroelectric test system by Radiant Technology.

Academic Details

- 2013: **Ph. D.** in Material Science (Physics),
Department of Electronic Science, Kurukshetra University, Kurukshetra,
India *and* Central Electronics Engineering Research Institute, Pilani,
Rajasthan, India.
Thesis: Property Modulation of Zinc Oxide Thin Films by Doping Through
Sol-Gel Process for Quantum Well Devices
Advisors: Prof. Dinesh Kumar (Ph.D. Cantab, Director UIET, KUK)
and Dr. Parmod Kumar Khanna (Scientist 'G', CEERI, Pilani).
- 2005: **Bachelor of Education (B. Ed.)** in Science and Mathematics
Dogra College, Jammu University, Jammu.
Grade: First
- 2003: **Master of Science (M. Sc.)** in Physics,
Dungar College Bikaner, M. D. S. University, Ajmer, India.
Grade: First
- 2000: **Bachelor of Science (B. Sc.)** with Physics, Chemistry and Mathematics,
Dungar College Bikaner, M. D. S. University, Ajmer, India.
Grade: First
- 1997: **Senior Secondary School** with Physics, Chemistry, Biology, English and
Hindi
Board of Secondary School Examination Rajasthan, Ajmer, India.
Grade: First
- 1995: **Secondary School**
Board of Secondary School Examination Rajasthan, Ajmer, India.
Grade: First

Professional Appointments

- 2014: **Assistant Professor** (Current)
Department of Physics
University of Rajasthan, Jaipur
Jaipur, India
- 2013: **Post-Doctoral Fellow**
School of Basic Sciences, Indian Institute of Technology, Mandi.
Project: Fabrication and characterization of polymer solar cells using synthesized novel
material
Advisor: Dr. Suman K. Pal

Projects:

2015: Design and Fabrication of Metal Oxide Semiconductor Structure Using Properties Modulated Graphene Oxide for Super Capacitor Application.
UGC Start up Grant 6.0 Lakhs, Principal Investigator: Dr. Amanpal Singh
Clair

M.Tech. Supervision

1. “Deposition and Thermal Reduction of Graphene Oxide Thin Films and Study of Its Optical, Electrical and Micro-Structural Properties” Ms. Ankansha Garg, Centre of Converging Technologies, University of Rajasthan, Jaipur.
2. “Deposition and Characterization of Indium Doped ZnO Thin Films by Sol-Gel Method” Mr. Aman Anish Khan, Centre of Converging Technologies, University of Rajasthan, Jaipur.
3. “Indium Doped Zinc Oxide Thin Films Derived by Sol-Gel Process and Its Characterizations for Transparent Conducting Oxide” Mr. Madan Lal Buri, Centre of Converging Technologies, University of Rajasthan, Jaipur.
4. “Deposition and Characterizations of Magnesium Doped Zinc Oxide Thin Films Deposited by Sol-Gel Process” Mr. Aniruddh Bohra, Centre of Converging Technologies, University of Rajasthan, Jaipur.

Teaching Experience

2012: Assistant Professor: Physics (Under Graduate Classes, B. Tech.)
National Institute of Technology, Kurukshetra.

2010: Guest Faculty: Physics (Post Graduate Classes, M. Tech. Nano
Science)

Department of Electronic Science, Kurukshetra University, Kurukshetra

2008: Guest Faculty: Basic Electronics (Post Graduate Classes, M. Sc.)

Department of Mass Communication, Kurukshetra University, Kurukshetra.

Books

1. Unit Contribution to **Physics Lab-I**, Vardhman Mahaveer Open University, Kota, ISBN 818496531-1.

Languages

English: Reading, Writing and Speaking; Senior Secondary School Certificate
Hindi: Reading, Writing and Speaking; Senior Secondary School Certificate
Punjabi: Reading, Writing and Speaking; Secondary School Certificate

Other Interests

Cricket, Badminton, Music, Movies, Video Games, To Meet Different Cultures World Wide,

Awards, Fellowships

2013: MHRDG Institute Post-Doctoral Fellowship
2010: CSIR- Senior Research Fellowship (Direct)
2004: CSIR- Junior Research Fellowship (NET)
1995: State Merit Scholarship (Offered)

Instruments Handling

- **X-Ray Diffractometer**
XPRT-PRO Gonio-meter PW3050/60: working with $\text{CuK}\alpha$ radiation of wavelength $\lambda=1.54060 \text{ \AA}$
- **UV-Vis Spectrophotometer**
Perkin Elmer Lambda 650
- **Atomic Force Microscope**
NTMDT Model Pro 47
- **Raman Spectromete**
Renishaw 1000 micro-Raman system
- **Ellipsometer**
Sentech SE400adv
- **Stylus Profiler**
Ambious XP-1
- **CV Analyzer**
Keithley 590 simultaneous CV analyzer
- **I-V instrument**
Keithley- 2602 and 4200 SCS system
- **Photoluminescence Mapping Tool**
RPM 2000 photoluminescence mapper
- **Particle Size Analyzer**
Microtrac Wave
- **High Vacuum Thermal Evaporation**
Hind Hivacuum coating unit
- **Sputtering dc and rf**
Assembled DC and RF sputtering machine
- **Spin Coater**
CEE 200 spin coating unit
- **High Temperature Furnaces**
Tube, Vacuum, Muffle

Research Papers

(<http://scholar.google.co.in/citations?user=k9AzAiAAAAAJ&hl=en>)

17. Reduction in Point Defects of Sol-Gel Derived ZnO Thin Films with Oxygen Ambient, **Amanpal Singh**, Dinesh Kumar, P.K. Khanna, Mukesh Kumar *Materials Letters*183 (2016) 365.
16. Band offset measurements in $Zn_{1-x}Sb_xO/ZnO$ hetero-junctions, Vanita Devi, Manish Kumar, Ravindra Kumar, **Amanpal Singh**, B C Joshi, *Journal of Physics D: Applied Physics*48 (2015) 335103.
15. Influence of Doping Precursor on Band Gap and Morphologies of ZnMgO Thin Films Deposited by Sol-Gel Route, **Amanpal Singh**, Sonia Saini, D. Kumar, P.K. Khanna, MukeshKumar,*PhysicaStatus Solidi C*11(2014)1488.
14. Deposition and characterization of amorphous electroless Ni-Co-P alloy thin film for ULSI application, A Kumar, AK Suhag, **Amanpal Singh**, SK Sharma, M Kumar, D Kumar, *Materials Research Express*1 (2014) 035007.
13. Effect of band gap offset on ZnO (Cd, Mg)/ ZnO:P Multi Quantum Well Light Emitting diodes: A Simulation Study, **Amanpal Singh**, Dinesh Kumar, P.K. Khanna, MukeshKumar,*Energy and Environment Focus*3 (2014) 1.
12. Post Annealing Effect on Structural and Optical Properties of ZnO Thin Films Derived by Sol-Gel Route, **Amanpal Singh**, D. Kumar, P.K. Khanna, Mukesh Kumar, *Journal of Material Science: Material Electronics*24 (2013) 4607.
11. Phase Segregation Limit in ZnCdO Thin Films Deposited by Sol–Gel Method: A Study of Structural, Optical and Electrical Properties, **Amanpal Singh**, D. Kumar, P.K. Khanna, Mukesh Kumar, *ECS journal of Solid State Science and Technology* 2 (2013) Q136.
10. Investigation of Phase Segregation in Sol-Gel Derived ZnMgO Thin Films **Amanpal Singh**,AnkushVij,D. Kumar, P.K. Khanna, Mukesh Kumar, S. Gautam, K.H. Chae, *Semiconductor Science and Technology*28 (2013) 025004.
9. Effect of Post Annealing Temperature on Structural and Optical Properties of ZnCdO Thin Films Deposited by Sol-Gel Method, **AmanpalSingh**,D. Kumar, P.K. Khanna, BhubeshChander Joshi, Mukesh Kumar, *Applied Surface Science*258(2011) 1881.
8. Dielectric Anomaly in Mg Doped ZnO Thin Film Deposited by Sol–Gel Method, **AmanpalSingh**,D. Kumar, P.K. Khanna, Anuj Kumar and Mukesh Kumar, *Journal of Electrochemical Society*58 (2011) G9-G12.
7. Anomalous Behavior in ZnMgO Thin Films Deposited by Sol-Gel Method, **AmanpalSingh**,D. Kumar, P.K. Khanna, Anuj Kumar, Mukesh Kumar, Mohit Kumar, *Thin Solid Films*519 (2011) 5826.
6. Nickel Silicide Formation by Electroless Technique for ULSI Technology, Anuj Kumar, Mukesh Kumar, **Amanpal Singh**, Satinder Kumar, Dinesh Kumar, *Microelectronic Engineering*87 (2011) 286.

5. Reactively Sputtered Amorphous MoN Film as a Diffusion Barrier for Copper Metallization, Anuj Kumar, **Amanpal Singh**, R. Kumar, M. Kumar, Dinesh Kumar, *Optoelectronics and Advanced Materials- Rapid Communications*5 (2011) 54.
4. Study on Thermal Stability of Electro-Less Deposited Ni-Co-P Alloy Thin Film, Anuj Kumar,**Amanpal Singh**, Mukesh Kumar, Dinesh Kumar, SumitBarthwal, *Journal of Material Science: Material Electronics*22 (2011) 1495.
3. Characterization of Smart-Materials based on Lead Lanthanum ZirconateTitanate, P.K. Khanna, **Amanpal Singh**, N. Kumar, ChandarShekhar, Y.K. Jain, H.C. Pandey, *Optoelectronics and Advanced Materials- Rapid communications* 4 (2010) 336.
2. Performance Characteristics of Smart-Materials Based on Lead ZirconateTitanate, P.K. Khanna, N. Kumar, **Amanpal Singh**, Chandra Shekhar, Y.K. Jain, H.C. Pandey, *Materials Letters*63 (2009) 1958.
1. Structural and Optical Characterization of ZnO Thin Films Deposited by Sol-Gel Method, **Amanpal Singh**, Anuj Kumar, Nikhil Suri, Satinder Kumar, Mukesh Kumar, P. K. Khanna, Dinesh Kumar, *Journal of Optoelectronics and Advanced Materials*11 (2009) 79.

International Conferences

7. Influence of Doping Precursor on Band Gap and Morphologies of ZnMgO Thin Films Deposited by Sol-Gel Route,**Amanpal Singh**, Sonia Saini, D. Kumar, P.K. Khanna, MukeshKumar,*EMRS Fall Meeting 2013, Warsaw University of Technology, Warsaw, Poland.*
6. Synthesis and Characterization of Graphene Thin Film byThermal Reduction, Sumita Rani, Mukesh Kumar, **Amanpal Singh**, Sumit Sharma, Dinesh Kumar *AIP Conf. Proc. 1536, 523 (2013); Proceeding of International Conference on Recent Trends in Applied Physics and Material Science, Bikaner (Rajasthan), India.*
5. Deposition and evaluation of self-assembled monolayer as diffusion barrier for copper metallization for integrated circuits, Sumit Sharma, Mukesh Kumar, Sumita Rani, **Amanpal Singh**, B. Prasad, Dinesh Kumar, *AIP Conf. Proc. 1536, 1163 (2013); Proceeding of International Conference on Recent Trends in Applied Physics and Material Science, Bikaner (Rajasthan), India.*
4. Band Gap Modulation in ZnO Thin Films through Cd Doping by Sol-Gel Method and its Characterization, Amanpal **Singh**, JagdishDeshwal,D. Kumar, P.K. Khanna, MukeshKumar,*ECS Transactions - Seattle, Washington, Volume 45, "Wide-Bandgap Semiconductor Materials and Devices 13"221st ECS meeting at Seattle, WA, USA, May 6-11, 2012.*
3. Post Annealing Effect on Structural and Optical Properties of ZnO Thin Films Deposited by Sol-Gel Route, **Amanpal Singh**, Dinesh Kumar, P.K. Khanna, Mukesh Kumar, *International Conference on Nanao-materials and Nanotechnology (ICNANO) at Delhi University, Delhi, December 18-21, 2011.*
2. Effect of Mg Concentration on Structural, Electrical and Optical Properties of ZnMgONanocrystalline Thin Films Deposited by Sol-Gel Route, **Amanpal Singh**, Dinesh Kumar, P.K. Khanna, Mukesh Kumar, *International conference on materials for advanced technologies (ICMAT) at Pan Pacific, Singapore, June 26 - July 1, 2011.*

1. Dielectric anomaly in Mg doped ZnO Thin Film Deposited by Sol-Gel Method, **Amanpal Singh**, P.K. Khanna, Anuj Kumar, Mukesh Kumar and D. Kumar, ECS Transactions, **28** (2010) 427, 217th ECS meeting at Vancouver, Canada, April 25-30, 2010.

National Conferences

8. Deposition of ZnInO Thin Films by Sol-Gel Route for the Application of Transparent Conducting Oxides, **Amanpal Singh**, Madan Lal Buri, *National Conference on Recent Advances in Nanoscience and Nanotechnology (NCRANNT-2016) at Department of Nanotechnology North Eastern Hill University, Shillong-793022, Meghalaya, India, September 8-9, 2016.*
7. Band gap Modulation in ZnO through Doping by Sol-Gel Method, **Amanpal Singh**, Kiran Walia, Dinesh Kumar, P.K. Khanna, Anuj Kumar, Mukesh Kumar, *AIP Conf. Proc. 1349, 595 (2011); 55th DAE Solid State Physics Symposium at Manipal University, Manipal, December 26-30, 2010.*
6. Microstructural study of ZnMgO nanoparticles synthesized by sol-gel method, **Amanpal Singh**, Sonia Saini, D. Kumar, P.K. Khanna, Mukesh Kumar, *National Conference on Electronic Technologies, NCET 2012, Goa College of Engineering, April 16-17, 2010.*
5. Effect of Annealing Temperature on Dielectric Constant of ZnMgO Thin Film Deposited by Sol-Gel Method, **Amanpal Singh**, Anuj Kumar, Mukesh Kumar, P.K. Khanna, Dinesh Kumar, *53rd DAE Solid State Physics Symposium at Bhabha Atomic Research Centre, Mumbai, India, December 16-20, 2008.*
4. Synthesis of ZnO Thin Film by Sol-Gel Method and its Characterization, **Amanpal Singh**, Anuj Kumar, Mukesh Kumar, P.K. Khanna and D. Kumar, *1st Rashtreeya Yuva Vaigyanik Sammelan organized by National Institute of Technology, Kurukshetra, Haryana, India, 28-30 November, 2008.*
3. Synthesis of Nano-Crystalline ZnO Thin Film by Sol-Gel Technique, **Amanpal Singh**, Anuj Kumar, Satinder Kumar, Mukesh Kumar, P.K. Khanna and Dinesh Kumar, *National conference on semiconductor materials and technology at Gurukula Kangri Vishwavidyalaya Haridwar India, 16-18 October, 2008.*
2. Development of Touch-Free Temperature Indicator for Specific Application **Amanpal Singh**, Supriya Jain, P.K. Khanna, Nitin Kumar, S. S. Sadistap, Y.K. Jain, H.C. Pandey, S.Kumar, I.C. Sharma, *National Systems Conference (NSC-2007), Manipal University, Udupi.*
1. Development of ZnO Substrates and a Conceptual Integrated Micro System Approach, **Amanpal Singh** and P.K. Khanna, *National conference on information technology: Emerging Engineering Perspective and Practices at Thapar University, Patiala, India, 6-7 April, 2007.*

Professional Activities

Reviewer of J. Electrochemical Society
Reviewer of ECS Journal of Solid State Science and Technology
Reviewer of Journal of Applied Physics D
Reviewer of Semiconductor Science and Technology
Reviewer of Progress in Photovoltaic
Reviewer of Physica B
Reviewer of Applied Physics A
Reviewer of RSC Advances
Reviewer of Indian Journal of Pure and Applied Physics
Reviewer of Journal of Electronic Materials
Reviewer of Journal of Applied Biomaterials and Functional Materials

Professional Courses

97th Orientation Program organized by HRDC, University of Rajasthan, Jaipur, from 18 May 2015 to 13 June 2015.

Memberships

Life Member of Thermal Physical Society, India
Life Member of Indian Science Congress, India

Other activities and Awards

2005: Winner Team at college level cricket Tournament

Referees

1. Professor Dinesh Kumar (Ph. D. Cantab)
Director, University Institute of Technology,
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3. Dr. Virender Singh
Associate Professor, Department of Electrical Engineering,
Indian Institute of Technology, Mumbai, India.
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4. Dr. Suman K. Pal,
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December 14, 2016: University of Rajasthan, Jaipur-302004, India.