

Dr. Raj Kishora Dash

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EDUCATION:

Ph. D. **Rensselaer Polytechnic Institute, Troy, NY, USA, 2006**
Nanotechnology, Advanced Materials and MEMS

M. S. **Rensselaer Polytechnic Institute, Troy, NY, USA, 2002**
Materials Science and Engineering (Nanomaterials)

RESEARCH INTERESTS:

Research Interests: Carbon based Hybrid & Nanocomposites, Functional Materials-1D, 2D Nanostructure, Flexible and Wearable Smart Materials, Nanostructured Thermoelectric materials, Thin films(Thermal evaporation and Sputtering), MEMS, NEMS, Sensors, Bio-MEMS, Microfluidic devices and Nano/Microfabrication.

COURSES TEACHING:

- Synthesis and Application of Nanomaterials (4)
- MEMS/NEMS and Nanofabrication Technology(4)
- Smart Materials for Sensors and Energy Applications(4)
- Mechanical Behavior of Materials(4)
- Materials Characterization (4)
- Concept in Materials Science and Engineering (4)
- Nanomaterials processing and characterization Lab (4)
- Introduction of Nanoscience and Engineering (4)

HONORS/AWARDS:

- **Invited speaker to deliver a talk in the prestigious international** conference at Stockholm, Sweden, which established a global networking platform between the researchers, scientists and students from more than 50 countries at the Silver Jubilee Assembly of Advanced Materials Congress held at *Stockholm, Sweden* during 24-27th March, 2019.
- Research work on graphene-based flexible and transparent composite materials published in leading National newspapers (**Indian Express, Hindu etc.**) and websites.
- **Authors Report High Review Satisfaction**, 2018, Springer Nature Publishing Group, 2018
- **Innovation pitch talk** for development of a simple and effective chemical doping process for graphene, ICMTECH, New Delhi, 2016.

- **Best Poster Award**, ICONSEA 2014, Hyderabad.
- **Award Best Oral Talk**, NCAFM, 2015, K L University, Vaddeswaram, India
- Nominated for **Who'sWho in America**, USA, 2007.
- **Award, Best Paper of the year**, Institute of Physics(IOP), UK, 2003.
- Research work cited in **"Top Papers 2003 Showcase"**, Institute of Physics publishing, UK, 2003.
- Research work cited in **national and international magazines, media, and leading websites demonstrate first-time nanofluids actuation** for MEMS and Microfluidic applications.
- Graduate research assistantship (2000-2006), Rensselaer Polytechnic Institute, Troy, NY, USA.

NATIONAL AND INTERNATIONAL PROJECTS :

Nationals : 4 projects completed (2 UGC, 1 UPE-II and 1 NPMAS ADA)

International : 1 Under process

Total funding generated : ~ **200 Lakhs (Established an Advanced Materials & NEMS Lab.)**

RESEARCH SCHOLARS GUIDED (from March, 2011):

Ph. D. : Total 10 (9 full time, 1 external)

Degree awarded: 5 Thesis Submitted: 2 Ongoing : 3

M. Tech : 14 (M. Tech thesis guided)

B. Tech : 15 (Major and summer projects (URP))

SELECTED PEER REVIEWED PUBLICATIONS : (Last five years)

Total no of publications (International - 32), (National – 4)

1. N. N. Pillala, D. B. Dommisa, K. Balaji and **R. K. Dash**, " In-situ chemically doping of graphene oxide(GO) and reduced graphene oxide(RGO) based one dimensional bismuth telluride based thermoelectric nanomaterials " (Under Review for final submission)
2. K. Balaji and **R. K. Dash**, "Synergetic effects of thermal annealing on the structure, morphology and composition of the chemically synthesized one dimensional Bi₂Te₃ nanomaterials", (submitted, Materials Science and Engg. B).
3. Bikash Borah and **R K Dash**, Enhanced thermal, optical and dielectric properties of Al₂O₃_RGO/PVA composites using a novel thermal reduction method" (submitted to Materials Science and Engineering B). **IF : 3.507**
4. N. N. Pillala, D. Dommisa and **R. K. Dash**, " Influence of morphology of the Bismuth Telluride nanomaterials on the thermo-physical properties of the cold-pressed *graphene oxide(GO) and reduced graphene oxide(rGO) incorporated bulk nanostructured thermoelectric materials (submitted, IOP- Nanotechnology)*)
5. Bikash Borah and **R K Dash**, " Thermally-shocked treated GO-CuO incorporated PVA nanocomposites with enhanced thermal stability and dielectric properties for flexible and wearable electronics", (submitted to J. Mat. Sc: Materials in Electronics)

6. D. Babu and **R. K. Dash**, “Comparative study of role of additives in synthesis of graphene oxide(GO)/gamma-alumina nanomaterials” (to be submitted)
7. K. Balaji, N. N. Pillala and **R. K. Dash**, “Influence of the reducing agent on the formation and morphology of the bismuth telluride nanostructures by using template assisted chemical process : From nanowires to ultrathin nanotubes”, *J. of Crystal Growth*, 533(2020)125474.
8. N. S. Anas, L. R. Krishna, **R. K. Dash**, R. Vijay, Tribological Performance of Al Alloys Dispersed with Carbon Nanotubes or Ni-Coated Carbon Nanotubes Produced by Mechanical Milling and Extrusion”, *Journal of Materials Engineering and Performance*, 29 (2020) 1630–1639.
9. N.S. Anas, M. Ramakrishna, **R.K. Dash**, Tata N. Rao, R. Vijay, “Effect of Carbon nanotubes on Solution Treatment Temperature and Dissolution Characteristics of Precipitates in Al alloy produced by High Energy Milling and Hot Extrusion”, *Transactions of the Indian Institute of Metals*, 72, 10 (2019)2687-2697.
10. N.S. Anas, M. Ramakrishna, **R.K. Dash**, Tata N. Rao, R. Vijay, “Influence of process control agents on microstructure and mechanical properties of Al alloy produced by mechanical alloying”, *Materials Science & Engineering A*, 751(2019)171-182.
11. Bikash Borah, Gunda Rajitha, and **R. K. Dash**, “ Investigation of the Thickness-dependent Optical and Electrical Properties of the GO/PDMS Nanocomposite for Wearable and Flexible Sensors”, *J. of Materials Science: Materials in Electronics*,29 23(2018)20216-20224.
12. K. Balaji and **R. K. Dash**,“ Simple Approach to Synthesize CNTs Uniformly Coated nanotubes Bi₂Te₃ Nanocomposites by Ball Milling”, *J. of Applied Nanoscience*, 8 8 (2018) 1887-1893.
13. G. Rajitha and **R. K. Dash**, “Optically Transparent and High Dielectric Constant Reduced Graphene Oxide (RGO)-PDMS based Flexible Composite for Wearable and Flexible Sensors”, *J. of Sensors and Actuators A: Physical* , 277,1(2018) 26-34
14. D. Babu and **R. K. Dash**, “Size-dependent Phase and Morphological Transformation of Alumina Nanoparticles”, *J. of Mat. Res. Express*, 5 3 (2018)035022.
15. G. Rajitha, M. B. Suresh and **R. K. Dash**, “Synthesis of graphene oxide and reduced graphene oxide using volumetric method by a novel approach without NaNO₂ or NaNO₃”, *J. of Applied Nanoscience*, 8,4 (2018) 751-758.
16. Debabrot Borgohain and **R.K. Dash**, “Understanding the influence of thermal annealing of the metal catalyst on the metal assisted chemical etching of silicon”, *J. of Materials Science: Materials in Electronics*, 29: 4211(2018).
17. D. Babu and **R. K. Dash**,” Influence of the source graphite size on the structure, and morphology of GO and RGO synthesized by Modified Hummer’s Method”, *Advanced Materials Letters*, 8(3), 315-321 (2017)
18. N.S. Anas, **R. K. Dash**, T. Rao, A.V. Reddy, R. Vijay, “Effect of carbon nanotubes as reinforcement on the mechanical properties of aluminium-copper-magnesium alloy”, *J. of Materials Engineering and Performance*, 26:3376-86(2017) DOI : 10.1007/s11665-017-2730-7.

19. Debabrot Borgohain, Ghanshyam Krishna and **R.K. Dash**, "Effect of Conductive and Non-conductive Substrates on the formation of anodic aluminum oxide (AAO) template for mask-less nanofabrication", *J. of Microelectronic Engineering*, 156, 1-6 (2016).
20. Bhavana Peri, Bikash Borha and **R. K. Dash**, "Effect of RF power on the growth morphology and roughness of PECVD thick SiC thin films for MEMS applications", *Bulletin of Materials Science*, 38(4), 1105-1112, (2015).

RECENT INVITED TALK: **(Last five years)**

Total - (32 International) and (12 – National)

1. Invited Speaker, Symposium on Carbon Nanomaterial Electronics, BITS Pilani, Rajasthan, India, 8-9 November, 2019.
2. Invited Speaker, Advanced Materials Congress Stockholm, Sweden, 22-27 March, 2019
3. Invited speaker, Presented paper (in Absentia), Paris, France Dec, 2018.
4. Invited lecture on "Frontiers in Nanoscience and Technology", Centre for Nanotechnology(CNF), UoH, 6-7 April, 2018.
5. Invited lecture on "Refresher Course on Material Sciences", HRDC, Academic Staff College, University of Hyderabad, 4th- 24th August, 2017.
6. Invited lecture on "Nanomaterials and future application", Organized by SEST, HRDC Academic Staff College, University of Hyderabad, Hyderabad, 20-25 March 2017.
7. Invited Speaker, "**Bioelectronics Conference**", 10-12th July, 2017, Berlin, Germany.
8. Invited talk, "Materials Characterization: Atomic Force Microscopy(AFM)", DBT-MHRD sponsored National Conference on "Advances in Biomaterials and Characterization Techniques(ABCT17)", Andhra Loyola College, Vijayawada, AP, 20-21st January, 2017.
9. Invited Planetary Talk, "Smart Materials for future Application", UGC sponsored conference on "*Smart Materials for Future Technology*", JMJ College for Women (Autonomous), Tenali, AP, 30th November, 2016.
10. Invited Talk, "Potential of Nanomaterials for Sensors Applications", 15th November, 2016, VNR VJIET, Hyderabad.
11. Invited Talk, ICMTech-2016, University of Delhi, 1-4 March, 2016.
12. Nominated for Invited Talk, 2nd Annual World Congress of Smart Materials-2016", March 4-6, 2016, Singapore.
13. Nominated for Invited Talk, 5th Annual World Congress of Nano Science & Technology – 2015, (Nano S&T-2015), XI'an, China, September 24-26, 2015.
14. Nominated for Invited Talk, 1st Annual World Congress of Smart Materials-2015, March 23-25, 2015, Busan, Republic of Korea, 2015.
15. Invited talk, "Graphene: Future Smart Materials for High Performance Applications", UGC Sponsored "National level workshop on Novel Materials", 13-14th Feb., 2015.
16. Invited talk, "Droplet Based Digital Microfluidics", Microfluidic & Lab on Chip India Meeting, Powai, Mumbai, 22-23 Jan, 2015.

SELECTED PRESENTATIONS/CONFERENCES/SYPOSIUM: **(Last five years)**

Total - (52 International) and (22 – National)

1. **Poster Presented(Bikash)** "Development of Ag-RGO/PDMS Based Flexible Smart Composite Material For Sensor Applications", International Conference on Functional Nanomaterials (ICFNM-2019)", **22-25 February 2019**, Varanasi, India.

2. **Poster Presented**(Anas and R. Vijaya), "Development of Higher Strength Aluminium Alloy (Al- 4.4 Cu- 0.5 Mg) by Mechanical Alloying", *National Conference on Development of Aluminium alloys and Downstream Products for Aerospace, Defence and other Strategic Applications*, 23-24 February, JNARDDC, Nagpur(2018).
3. **Poster Presented**(Bikash Borah and Gunda Rajitha), "Study of the Electrical, Optical, Thermal and Sensing Properties of the Graphene Oxide (GO)-PDMS Flexible Nanocomposite for Sensors and MEMS", *International Conference on Nanotechnology: Idea, Innovations & Initiatives (ICN:3I -2017)*, IIT Roorkee, India, December 6-8(2017).
4. **Poster Presented**, (D. Borgohain), "Comparative Study of Thermal Annealing Effect of Gold (Au) and Silver (Ag) Metal Catalysts on Metal Assisted Chemical Etching (MACE) of Silicon (Si)", *International Conference on Nanotechnology: Idea, Innovations & Initiatives (ICN:3I -2017)*, IIT Roorkee, India December 6-8(2017).
5. **Paper presented** (G. Rajitha), "Investigation of the Dielectric Properties of rGO-PDMS and Functionalized-rGO-PDMS Nanocomposites", *International Conference on Nanotechnology: Idea, Innovations & Initiatives (ICN:3I -2017)*, IIT Roorkee, December 6-8(2017).
6. **Paper presented** (Naveen), "Development of 1D Bi₂Te₃ Thermo-electric Nanocomposites for Energy Applications", *A. P. Science Congress*, Visakhapatnam, AP, 7th – 9th November (2017).
7. **Innovation pitch talk** (G. Vasundhara), Exfoliation of higher quality graphene by low boiling point solvent blend, *International Conference of Nanomaterials and nanotechnology*, 1-3 March, VBRI, Allahabad, India, 2017.
8. **Poster Innovation pitch talk**, Patterning of Hydrogenated amorphous SiC thin films by wet chemical etching in KOH and HF:HNO₃, *International Conference of Nanomaterials and nanotechnology*, 1-3 March, VBRI, Allahabad, India, 2017.
9. **Oral Presentation**(Naveen), "Fabrication of rGO-Bismuth Telluride Thermo-electric Nanocomposite for Energy Harvesting", *ICFM2016*, III Kharagpur, 23-24th Dec, 2016.
10. **Poster Presented** (Naveen), "Influence of Graphene Oxide/Reduced Graphene Oxide on the Structure, Morphology and Band gap of Bi₂Te₃ Nano-composite Synthesis by Rational Method for Thermoelectric Applications", *Conference on Emerging Materials (CEMAT)*, IISc. Bangalore, 18-19 July, 2016.
11. **Poster presented** (Sushree), "Study of Alumina Nanoparticles effect on the dispersion stability of alumina based nanofluids by UV spectroscopy", *Int. Conference on Advanced Materials (ICAM-2016)*, IIT Roorkee, 4-7 March, 2016.
12. **Paper Presented** (Vasundhara)," Simple and Effective Chemical Process for Synthesis of Nitrogen Doped Graphene", *Int. Conference on Materials Science and Technology (ICMTech-2016)*, University of Delhi, 1-4 March, 2016.
13. **Poster Presented** (Demudu),"Influence of graphite size on the structural, optical and thermal properties of graphite oxide and reduced graphene oxide synthesis by modified Hummer's method", *Int. Conference on Materials Science and Technology(ICMTech-2016)*, University of Delhi, 1-4 March, 2016.

14. **Poster Presented** (Rajitha), "Development of Functionalize Graphene-PDMS Nanocomposite Materials for Flexible Electronics and MEMS applications", *Int. Conference on Materials Science and Technology (ICMTech-2016)*, University of Delhi, 1-4 March, 2016.
15. **Poster Presented** (Usha), "Study of Thermo-physical properties of MWCNTs based Nanofluids", *Int. Conference on Materials Science and Technology (ICMTech-2016)*, University of Delhi, 1-4 March, 2016.
16. **Paper Presented** (Balaji), "Influence of Annealing Temperature on the Structure and Morphology of Bi₂Te₃ Thermoelectric Materials Synthesized by Rational Method", *National Conference on Advances in Materials (NCAMPC – 2016)*, NIT Warangal, Warangal. 4-6 January, 2016.
17. **Poster Presented** (Vasundhara), "Effect of Chemical Exfoliation Parameters on Synthesis of Flat Type Graphene for NEMS Applications", *National Conference on Advances in Materials (NCAMPC – 2016)*, NIT Warangal, Warangal. 4-6 January, 2016.
18. **Paper Presented** (Rajitha), "Study of stability and optical properties of f-RGO and RGO-PDMS nanocomposites for MEMS applications", *National Conference on Advances in Materials (NCAMPC – 2016)*, NIT Warangal, Warangal. 4-6 January, 2016.
19. **Poster Presented** (Sushree), "Thermal conductivity of alumina nanofluids", CHEMCON-2015, IIT Guwahati, 27-30, December, 2015.
20. **Poster Presented** (Debabrot), "Development of a Novel Mask-Less Microfabrication Process for Nanostructure formation by using Metal Assisted Chemical Etching", *4th Int. Conference Advanced Nanomaterials and Nanotechnology (ICANN-2015)*, IIT Guwahati, Guwahati, ASSAM, 8-11 December, 2015.
21. **Poster Presented** (Bikash), "Development of a Wet-Chemical Etching Process for Fabrication of SiC Cantilevers for MEMS Applications", *4th Int. Conference Advanced Nanomaterials and Nanotechnology (ICANN-2015)*, IIT Guwahati, Guwahati, ASSAM, 8-11 December, 2015.
22. **Poster Presented** (Naveen), "Study of Structure and Morphology of Graphene Oxide/Reduced Graphene Oxide Based Bi₂Te₃ Nano-Composite for Thermoelectric Devices", *4th Int. Conference Advanced Nanomaterials and Nanotechnology (ICANN-2015)*, IIT Guwahati, Guwahati, ASSAM, 8-11 December, 2015.
23. **Poster Presented** (Rajitha), "Development of Graphene-PDMS Electrically Conductive Nanocomposite for Microfluidic and MEMS Applications", *4th Int. Conference Advanced Nanomaterials and Nanotechnology (ICANN-2015)*, IIT Guwahati, Guwahati, ASSAM, 8-11 December, 2015.
24. **Paper presented** (Hussen), "Comparative Morphology Study of Graphene Oxide (GO) Thin Films Deposited on different Substrates", NCAFM, K L University, Vaddeswaram, 3-4 Septemeber, 2015.
25. **Paper presented** (Anas), "Optimization of solution heat treatment for Aluminium alloy-CNT/Graphene composites", *National Conference on Materials Science and Technology (NCMST-2015)*, IIST Thiruvananthapuram, India, July 6-8th, 2015.
23. **Paper presented** (Hussen), "Structural, Morphological, Optical characterization of Graphene Oxide and rGO films", RAINSAT-2015, Satyabhama University, Chennai, July 8th-10th, 2015.

24. Paper Presented(Bharat Kumar), “Structural and Morphological Evolution of Vacuum Annealing PECVD SiC Thin Films for High Temperature MEMS Applications”, ICITMC’15, PET Engineering College, Vellore, Tamilnadu, India, 10th April, 2015.

MEMBER OF PROFESSIONAL SOCIETY:

1. International Association of Advanced Materials (IAAM)
2. RPI-ALUMINI ASSOCIATION, NY,USA
3. Member: Life time, Materials Research Society of India (MRSI).
4. Member: Life time, Institute of Smart Structures and Systems (ISSS).
5. Member: Life time, RPI Alumni Association, NY, USA

EXTERNAL INTERACTION/ COLLABORATORS:

IISC, Bangalore, ARCI, Hyderabad, DMRL, Hyderabad, NAL, Bangalore, RCI, Hyderabad, IIT Hyderabad, Hyderabad, IOP, Bhubaneswar, IGCAR, IIT Chennai, IIT Kharagpur, C-MET, Hyderabad, ADA, Bangalore, Rensselaer Polytechnic Institute, NY,USA.