Curriculum Vitae

1. Name: PALLAB BANERJI

2. Date of Birth: January 01, 1965

3. Current Position and address: Professor (Higher Administrative Grade) [Present Basic pay: Rs. 224100/-, w.e.f. 18.8.2020; Pay Level 15 of 7th CPC Pay matrix], Materials Science Centre, Indian Institute of Technology (IIT), Kharagpur 721302, West Bengal

E-mail: pallab@matsc.iitkgp.ac.in; pallabbanerji3@gmail.com

Phone: 9434722493

4. Educational Qualifications:

Sl. No.	Degree/Certificate	Year of passing	University/ Institute	%Marks	Subjects
1	Ph.D.	1995	Jadavpur University		Electronics
2	M.Sc. (1st Class)	1987	Calcutta University	1st Class (73.1%)	Electronic Science
3	B.Sc.(1st Class)	1985	Calcutta University	1st Class (61.5%)	Physics (Hons)
4	Higher Secondary (1st Division)	1982	West Bengal Council	1st Division	Physics, Chemistry, Mathematics
5	Secondary (1st Division)	1980	West Bengal Board	1st Division	Bengali, Eng., Phy. Sc., Maths., Hist., Geog.

5. Academic/Research Experience/Employment:

Sl. No.	From	To	Name of Organization	Position held
1	18.8.2020	Till date	Indian Institute of Technology Kharagpur	Professor (Higher Admin. Grade)
2	3.3.2014	Till date	Indian Institute of Technology Kharagpur	Professor
3	12.4.2007	2.3.2014	Indian Institute of Technology Kharagpur	Associate Professor
4	6.10.2005	11.4.2007	Indian Institute of Technology Kharagpur	Assistant Professor
5	January 2002	5.10.2005	Techno India Group (West Bengal University of Technology)	Assistant Professor
6	June 1997	December 2000	Materials Science Centre/ ATDC, IIT Kharagpur	Project Officer

ICTP TRIL Fellowship (2001) for Travelling & Research in Italian Laboratories funded by ICTP, Trieste.

6. Administrative Experience (after Professorship):

Chairman, Hall Management Committee	01-08-2014	13-09-2015
Registrar (Officiating)	November 2014	April 2015
Vice-Chairman, Joint Entrance Examination (Advanced) 2016	02-09-2015	31-08-2016
Chairman, Joint Entrance Examination (Advanced) 2017	01-09-2016	31-08-2017
Chairman, Joint Entrance Examination (Advanced) 2018	01-09-2017	31-08-2018
Head, Materials Science Centre	08-05-2017	07-05-2020

Member, Executive Committee, National Assessment and Accreditation Council (NAAC) (since May 08, 2023);
Member, Governing Body, S. N. Bose National Centre for Basic Sciences, Kolkata (since October 28, 2021);
Member, Governing Council, Centre for Nano and Soft Matter Sciences, Bengaluru (since August 5, 2021);
Member, Board of Governors, National Institute of Advanced Manufacturing Technology (NIAMT), Ranchi (since March 19, 2020);
Member, Science & Engineering Research Board (SERB), Department of Science & Technology (DST), Govt. of India (till July 30, 2021);
Member, Board of Governors, IIT (ISM) Dhanbad (since July 11, 2018)

7. Honors/Awards/Recognitions received:

(i) MRSI Medal (Materials Research Society of India), 2016

(ii) ICTP Fellowship for Travelling & Research in Italian Laboratories (TRIL) 2001

(iii) Best Paper award in MRSI Annual Meeting, Bangalore, 2000

Member, Science & Engineering Research Board (SERB), DST, Govt. of India

8. Areas of Specializations: Materials & devices for energy & environment with special emphasis on materials & devices for thermoelectrics & photovoltaics, Photonics, Nano-materials, III-V and other compound semiconductors, Low dimensional semiconductor structures.

9. (a) List of Research Publications: Annexure – I (pp. 9 – 23)

(b) List of best professional outputs/outcomes relevant to present field of specializations:

(i) Growth of III-V semiconductors on Si substrates for integration of optoelectronics with existing microelectronic technology. [**CrystEngComm** 17, 8519 (2015), **Journal of Crystal Growth** 418, 138 (2015).

(ii) Non-volatile memory devices [**Applied Physics Letters** 101, 212108 (2012); **Carbon** 64, 187 (2013); **Journal of Applied Physics** 114, 084509 (2013); **Organic Electronics** 15, 144 (2014)]

(iii) Graphene electronics [**Langmuir** 28, 16485 (2012); **ACS Applied Materials & Interfaces** 6, 16941 (2014); **Journal of Physics and Chemistry of Solids**, 122, 137 (2018)].

(iv) Humidity sensors, gas sensors [**Journal of Alloys and Compounds** 541, 376 (2012); **Sensors and Actuators B: Chemical** 178, 331(2013); **Sensors and Actuators B: Chemical** 183, 172 (2013)].

(v) Enhancement of the thermoelectric power factor [**Applied Physics Letters** 98, 262101 (2011); **Journal of Applied Physics** 109, 103710 (2011); **Nanotechnology** 24, 215401 (2013); **ACS Applied Materials & Interfaces** 6, 3995 (2014)].

(vi) Quantum dot based photovoltaics [**Applied Physics Letters** 106, 012103 (2015); **Solar Energy Materials & Solar Cells** 132, 230 (2015)].

(vii) Lead-free ferroelectric on HfO_2/Si (100) and (100) Nb-doped $SrTiO_3$for high performance non-volatile memory applications [**Scientific Reports** 5, 8494 (2015); **Scientific Reports** 5, 12415 (2015)]

(viii) Single $In_xGa_{1-x}As$ nanowire/p-Si heterojunction based nano-rectifier diode [**Nanotechnology** 28, 385202 (2017)].

(ix) Fabrication and studies on Si/InP core-shell nanowire based solar cell using etched Si nanowire arrays [**Solar Energy Materials and Solar Cells** 204, 110217 (2020)].

(x) GaAs based MOS capacitor [**Journal of Physics D: Applied Physics** 44, 155104 (2011); **Solid State Communications** 151, 1881 (2011); **Journal of Vacuum Science and Technology B** 30, 051206 (2012); **Journal of Applied Physics** 112, 034514 (2012); **Materials Science in Semiconductor Processing** 15, 386 (2012)]

(c) Highlights of contributions to the area of specializations: Annexure - II (pp. 24 – 25)

10. Dissertation Supervised:

(i) Ph.D.: 22 (**Annexure – III, pp. 26 – 27**)

(ii) Post Graduations: 30 (**Annexure – IV, pp. 28 – 30**)

11. Teaching:

(i) Regular classroom teaching:

Level: B.Tech. and M.Tech.

Years: 29 years

Course taught:

M. Tech. level	(i)	Science & Technology of Semiconductors (MS60005)
	(ii)	Solar Energy Materials (MS60030)
	(iii)	Techniques of Material Characterization (MS60004)
	(iv)	Advanced Laboratory (MS69004)
	(v)	Epitaxy of Compound Semiconductors (MS60023)
	(vi)	Polymers for Electronic and Photonic Applications (MS60066)
	(vii)	Fundamentals of Electronic Materials (MS60009)
B. Tech. level	(i)	Photonic Materials & Applications (MS31001)
	(ii)	Material Science (MS31007)

(ii) Short term course as Principal Coordinator (funded by MHRD, New Delhi):

(a) Nanoelectronics: Science, Nanotechnology, Engineering and Applications: July 7 – 19, 2008.

(b) Nanotechnology: Processing & Applications: September 14 – 19, 2009.

(c) Optoelectronic Materials & Devices: 29 December 2008 to 3 January 2009.

(d) Nanotechnology for electronic & photonic applications: October 3 – 17, 2012.

(e) Materials Engineering & Industrial Applications: Hybrid Nanocomposites for Photonics, Energy & Electronics applications (QIP): November 11-22, 2013.

(f) Thin Film Technology for Waste heat recovery (GIAN): December 5 – 12, 2015.

(iii) Web course development (under NPTEL):

Developed a web course entitled "Processing of semiconducting materials"

(40 lectures) Level: PG

12. Sponsored Research Projects: Annexure – V (pp. 31 – 32)

13. Number of books authored/edited: 03

(i) P.K. Rawat, B. Paul and **P. Banerji**, Chapter entitled "Lead telluride based thermoelectrics: approaches for higher efficiency" in Energy Book Series titled "**Materials and processes for energy: communicating current research and technological developments**" (ed. A. Méndez-Vilas) Published by Formatex Research Centre (Badazoj, Spain, 2013).
(ii) S. Mahaboob Jilani and **P. Banerji**, Chapter entitled "Graphene Oxide: An Important Derivative of Graphene with Interesting Electrical Properties" in **Graphene Science Handbook: Electrical and optical properties**, Published by CRC Press/Taylor Francis (Boca Raton, USA, 2016).
(iii) S. Samanta, **P. Banerji** and P. Ganguly, **Photonic Waveguide Components on Silicon Substrate: Modeling and Experiments**, (Springer, Singapore, 2020).

14. Other Information:

A. Professional Affiliations:

(i) Member, Materials Research Society
(ii) Member, Board of Governors, IIT (ISM), Dhanbad, and NIFFT, Ranchi
(iii) Visitor Nominee for IIT Roorkee, and IIT Hyderabad for the Departments of Metallurgical & Materials Engineering
(iv) Reviewer for the journals of American Institute of Physics, American Physical Society, American Chemical Society, and Elsevier.

B. Collaborations:

(i) Technion – Israel Institute of Technology, Haifa, Israel: Department of Materials Science & Engineering (Prof. M. Eizenberg),
(ii) Virginia Tech, USA: Department of Mechanical Engineering (Prof. S. Priya),
(iii) University of South Carolina, USA: Department of Electrical Engineering (Prof K. Mandal),
(iv) Saha Institute of Nuclear Physics, Kolkata: Surface Physics and Material Science (Prof. S. Bhunia & Prof. S. Chakraborty)
(v) Calcutta University: Department of Electronic Science (Prof. S. Chattopadhyay)
(vi) UGC – DAE Consortium for Scientific Research, Indore (Dr. T. Shripathi)

C. Invited talk:

(a) MOCVD growth, fabrication & characterization of III-V semiconductor based optoelectronic devices, IEEE, Kolkata Chapter.
(b) Recent trends in material sciences and technology, SVNIT, Surat.
(c) CVD of Nanomaterials: DST Advanced School on Nano Science & Technology at S.N. Bose National Centre for Basic Sciences, Kolkata.
(d) MOCVD growth of Nanostructure Devices at Indian Association for the Cultivation of Science, Kolkata.
(e) Israel Institute of Technology, Technion, Haifa - GaAs based Metal-Oxide-Semiconductor capacitors with high-k dielectrics: interface engineering.
(f) Waste heat recovery: concept, materials and state-of-the art in thermoelectricity at Osmania University, Hyderabad, International Conference on Applications of Renewable and Sustainable Energy for Industry and Society.
(g) Achieving a higher value for thermoelectric figure of merit in PbTe (Indo-US Workshop on Thermoelectrics, IIT Bombay).
(h) Sources for fiber optic communication, white LEDs and Blu-ray disc: three modern photonic devices at College of Engineering & Management, West Bengal.

15. Administrative Experience:

Sl. No.	Position held in IIT Kharagpur	From	To
1	Asst. Warden, Madan Mohan Malviya Hall of Residence	01-01-2006	04-03-2009
2	Warden, Lala Lajpat Rai Hall of Residence	05-03-2009	28-02-2013
3	Warden, Rajendra Prasad Hall of Residence	01-03-2013	08-06-2013
4	Coordinating Warden, Hall Management Committee (Mess)	09-06-2013	31-08-2014
5	Chairman, Hall Management Committee	01-08-2014	13-09-2015
6	Registrar (Officiating)	November 2014	April 2015
7	Vice-Chairman, Joint Entrance Examination (Advanced) 2016	02-09-2015	31-08-2016
8	Chairman, Joint Entrance Examination (Advanced) 2017	01-09-2016	31-08-2017
9	Chairman, Joint Entrance Examination (Advanced) 2018	01-09-2017	31-08-2018
10	Head, Materials Science Centre	08-05-2017	07-05-2020

Annexure - I

List of Research publications: Prof. Pallab Banerji

145. A. Das and **P. Banerji**, Unusual Transport and Impact of Nonparabolic Electronic Band Structure on the Thermoelectric Performance in n-Type In_4Se_3-Based Thermoelectric Materials, **physica status solidi (b)**, https://doi.org/10.1002/pssb.202300078

144. S. Das, S. Pal, K. Larsson, D. Mandal, S. Giri, **P. Banerji**, A. Chandra, and R. Basori, Hydrothermally grown SnS2/Si nanowire core-shell heterostructure photodetector with excellent optoelectronic performances, **Applied Surface Science** 624, 157094 (2023).

143. S. Sen, D. Acharya, P. K. Guha, **P. Banerji**, and P. Pramanik, A simple chemical reduction approach to dope β-FeSi 2 with boron and its comprehensive characterization, **RSC Advances** 13, 12825 (2023).

142. S. N. Choudhury, P. Das, P. Bhawal, A. Pal, **P. Banerji**, and N. C. Das, Double percolation behavior through the preferential distribution of conductive black in polymer blends to boost electrical properties and EMI shielding effectiveness, **Materials Today Communications**, 35, 106109 (2023).

141. T. Ghosh, R. Sahoo, S. K. Ghosh, **P. Banerji** and N, C. Das, Simplistic hydrothermal synthesis approach for fabricating photoluminescent carbon dots and its potential application as an efficient sensor probe for toxic lead(II) ion detection, **Frontiers of Chemical Science and Engineering** 17, 536 (2023).

140. T. Ghosh, S. Nandi, S. K. Bhattacharyya, S. K. Ghosh, M. Mandal, **P. Banerji** and N. C. Das, Nitrogen and sulphur doped carbon dot: An excellent biocompatible candidate for *in-vitro* cancer cell imaging and beyond, **Environmental Research** 217, 114922 (2023).

139. A. Dutta, P. Panda, A. Das, D. Ganguly, S. Chattopadhyay, **P. Banerji**, D. Pradhan and R. K. Das, Intrinsically Freezing-Tolerant, Conductive, and Adhesive Proton Donor–Acceptor Hydrogel for Multifunctional Applications, **ACS Applied Polymer Materials** 4, 7710 (2022).

138. T. Ghosh, T. K. Das, P. Das, **P. Banerji** and N. C. Das, Current scenario and recent advancement of doped carbon dots: a short review scientocracy update (2013–2022), **Carbon Letters** 32, 953 (2022).

137. P. Dhama, A. Kumar and **P. Banerji**, Combined effects of indium nanoinclusion and Se-deficiency on thermoelectric performance of n-type indium selenide, **Journal of Alloys and Compounds**, 901, 163653 (2022).

136**.** M. Palit, B. Nag Chowdhury, S. Sikdar, K. Sarkar, **P. Banerji** and S. Chattopadhyay, Band splitting induced by momentum-quantization in semiconductor nanostructures: Observation of emission lines in Indium Phosphide (InP) nanotubes, **Physics Letters A**, 388, 127056 (2021).

135. P. Das, S. K. Bhattacharyya, **P. Banerji**, N. C. Das, Acoustic cavitation assisted synthesis and characterization of photoluminescent carbon quantum dots for biological applications and their future prospective, **Nano-Structures & Nano-Objects**, 25, 100641 (2021).

134. S. Das, K.J. Sarkar, B. Pal, S. Mondal, S. Pal, R. Basori and **P. Banerji**, SnS2 /Si nanowire vertical heterostructure for high performance ultra-low power broadband photodetector with excellent detectivity, **Journal of Applied Physics**, 129, 053105 (2021).

133. A. Das, A. Kumar and **P. Banerji**, First principles study of electronic structure and thermoelectric transport in tin selenide and phase separated tin selenide-copper selenide alloy, **Journal of Physics: Condensed Matter** 32, 265501 (2020).

132. B. Pal, K.J. Sarkar and **P. Banerji**, Fabrication and studies on Si/InP core-shell nanowire based solar cell using etched Si nanowire arrays, **Solar Energy Materials and Solar Cells** 204, 110217 (2020).

131. B. Tiwari, P.V. Rajeswari, S. Ram, **P. Banerji** and R. Khan, Green synthesis of Cr^{3+} doped $CaIn_2O_4$ - carbon hybrid nanostructure and its light absorption and emission properties, **Journal of Nanoscience and Nanotechnology**, 19, 8120 (2019).

130. K. Sarkar and **P. Banerji**, Diameter-dependent growth direction of $In_xGa_{1-x}As$ nanowires: transition from nanowire growth to substrate etching with silver catalyst size, **physica status solidi (b)**, 1900016 (2019).

129. B. Tiwari, S.K. Sharma, S. Ram and **P. Banerji**, Synthesis of broad band violet–blue light-emitting core–shell Cr3+: C–$CaIn_2O_4$ nanowires, **Journal of Nanoscience and Nanotechnology**, 19, 5769 (2019).

128. A. Das, A. Kumar, K.J. Sarkar, R. Mula and **P. Banerji**, Density functional study of Na doped Tin selenide, **AIP Conference Proceedings** 2115, 030477 (2019).

127. K. J. Sarkar, B. Pal and P. Banerji, Graphene oxide as a dielectric and charge trap element in pentacene-based organic thin-film transistors for nonvolatile memory, **ACS Omega** 4, 4312 (2019).

126. B. Tiwari, S. Ram and P. Banerji , Biogenic synthesis of tunable core–shell C-$CaIn_2O_4$, interface bonding, conductive network channels, and tailored dielectric properties, **ACS Sustainable Chemistry & Engineering** 6, 16298 (2018).

125. S. Samanta, P.K. Dey, **P. Banerji** and P. Ganguly, A 1 × 2 polarization-independent power splitter using three-coupled silicon rib waveguides, **Journal of Optics**, 20, 095801 (2018).

124. K. J. Sarkar, K. Sarkar, B. Pal, A. Kumar, A. Das and **P. Banerji**, Ambipolar transport of silver nanoparticles decorated graphene oxide field effect transistors, **AIP Conference Proceedings** 1953, 100020 (2018).

123. A. Das, M. Talukdar, A. Kumar, K. J. Sarkar, P. Dhama and **P. Banerji**, Thermoelectric study of Ag doped SnSe-Sb_2Se_3 based alloy, **AIP Conference Proceedings** 1953, 050023 (2018).

122. A. Kumar, P. Dhama, A. Das, K. J. Sarkar and **P. Banerji**, Enhanced electrical transport and thermoelectric properties in Ni doped Cu_3SbSe_4, **AIP Conference Proceedings** 1953, 050030 (2018).

121. S. Chowdhury, A. Das and **P. Banerji**, Growth of indium gallium arsenide thin film on silicon substrate by MOCVD technique, **AIP Conference Proceedings** 1953, 030233 (2018).

120. K. J. Sarkar, B. Pal and **P. Banerji**, Fabrication of InP-pentacene inorganic-organic hybrid heterojunction using MOCVD grown InP for photodetector application, **AIP Conference Proceedings** 1942, 060011 (2018).

119. P. Dhama, A. Kumar and **P. Banerji**, Improved microstructure and thermoelectric properties of iodine doped indium selenide as a function of sintering temperature, **AIP Conference Proceedings** 1942, 140080 (2018).

118. A. Kumar, P. Dhama and **P. Banerji**, Enhanced thermoelectric properties in Bi and Te doped p-type Cu_3SbSe_4 compound, **AIP Conference Proceedings** 1942, 140055 92018).

117. S. Samanta, **P. Banerji** and P. Ganguly, Design of a Novel Polarization-Independent Power Splitter Using Coupled Silicon Rib Waveguides, **Frontiers in Optics**, JW4A. 48 (2017).

116. S. Samanta, **P. Banerji** and P. Ganguly, Design and fabrication of SU-8 polymer based photonic crystal waveguide, **Frontiers in Optics**, JW3A. 70 (2017).

115. K. J. Sarkar, K.Sarkar, B.Pal and **P.Banerji**, Graphene quantum dots as charge trap elements for nonvolatile flash memory, **Journal of Physics and Chemistry of Solids**, 122, 137 (2018).

114. S. Samanta, P.K. Dey, **P. Banerji** and P. Ganguly, Development of micro-ring resonator-based optical bandpass filter using SU-8 polymer and optical lithography, **Optical materials** 77, 122 (2018).

113. K. Sarkar, M. Palit, S. Guhathakurata, S. Chattopadhyay and **P. Banerji**, Single $In_xGa_{1-x}As$ nanowire/p-Si heterojunction based nano-rectifier diode, **Nanotechnology** 28, 385202 (2017).

112. B. Tiwari, S. Ram and **P. Banerji**, Aloe-vera mediated synthesis of Eu^{3+} doped $CaIn_2O_4$-carbon hybrid nanostructure and its light emission properties, **MRS Advances** 2, 141 (2017).

111. S. Samanta, P.K. Dey, **P. Banerji** and P. Ganguly, Comparative study between the results of effective index based matrix method and characterization of fabricated SU-8 waveguide, **Optics Communications** 382, 632 (2017)

110. S. Samanta, P. Banerji and P. Ganguly, Focused ion beam fabrication of SU-8 waveguide structures on oxidized silicon, **MRS Advances** 2, 981 (2017).

109. K. Sarkar, M. Palit, S. Chattopadhyay and **P. Banerji**, An analysis of the growth of silver catalyzed $In_xGa_{1-x}As$ nanowires on Si (100) by metalorganic chemical vapour deposition, **Journal of Applied Physics 120,** 084309 (2016)

108. T.K. Das, P. Banerji and S.K. Mandal, Giant magnetoimpedance intrinsic impedance and voltage sensitivity of rapidly solidified $Co_{66}Fe_2Cr_4Si_{13}B_{15}$ amorphous wire for highly sensitive sensors applications, **Applied Physics A** 122, 939 (2016).

107. S. Mahaboob Jilani and P. Banerji, Graphene Oxide: an important derivartive of graphene with interesting electrical properties: in Graphene Science Handbook: Electrical and Optical Properties, Edited by Mahmood Aliofkhazraei, Nasar Ali, William I. Milne, Cengiz S. Ozkan, Stanislaw Mitura, Juana L. Gervasoni (**CRC Press**, 2016)

106. S. Sen, P. K. Guha, P. Banerji and P. Pramanik, Mn and As doping of b-FeSi2 via a chemical method, **RSC Advances** 6, 68238 (2016).

105. A. Kumar, P. Dhama, D. S. Saini and **P. Banerji**, Effect of Zn substitution at a Cu site on the transport behavior and thermoelectric properties in Cu_3SbSe_4, **RSC Advances** 6, 5528 (2016).

104. S. Samanta, P. Banerji and P. Gangopadhyay, Effective index based matrix method for silicon waveguides in SOI platform, **Optik** 126, 5488 (2015).

103**. S. Kundu, N.N. Halder,** P. Banerj and S. Priya, Reliability of passivated and unpassivated high-k dielectric/GaAs metal-oxide-semiconductor capacitors**, Integrated Ferroelectrics**, 166, 197 (2015).

102. P. Biswas, P. Nath, D. Sanyal and **P. Banerji**, An alternative approach to investigate the origin of p-type conductivity in arsenic doped ZnO, **Current Applied Physics** 15, 1256 (2015).

101. S. Sen, N. Gogurla, P. Banerji, P. K. Guha and P. Pramanik, Synthesis and characterization of β-phase iron silicide nano-particles by chemical reduction, **Materials Science & Engineering B** 200, 28 (2015).

100. Sk Masiul Islam, P. Biswas, **P. Banerji** and S. Chakraborty, InAs quantum dots as charge storing elements for applications in flash memory devices, **Materials Science & Engineering B** 198, 102 (2015).

99. S. Kundu, M. Clavel, P. Biswas, B. Chen, H.-C. Song, P. Kumar, N. Halder, M. Hudait, **P. Banerji**, M. Sanghadasa and S. Priya, Lead-free epitaxial ferroelectric material integration on semiconducting (100) Nb-doped $SrTiO_3$ for low-power non-volatile memory and efficient ultraviolet ray detection, **Scientific Reports 5**, 12415 (2015).

98. Sk Masiul Islam, S. Chowdhury, K. Sarkar, B. Nagabhushan, **P. Banerji**, S. Chakraborty and R. Mukherjee, GaAs metal-oxide-semiconductor based non-volatile flash memory devices with InAs quantum dots as charge storage nodes, **AIP Conference Proceedings** 1665, 050035 (2015).

97. N. N Halder, P. Biswas, A. Choudhuri and **P. Banerji**, Fabrication and characterization of p-Si/n-ZnO heterojunction ultraviolet photodetector, **AIP Conference Proceedings** 1661, 110008 (2015).

96. P. Mukhopadhyay, R. Kumar, S. Ghosh, A. Chakraborty, A. Bag, S. Kabi, **P. Banerji** and D. Biswas, A novel growth strategy and characterization of fully relaxed un-tilted FCC GaAs on Si (100), **Journal of Crystal Growth** 418, 138 (2015).

95. S. Kundu, D. Maurya, M. Clavel, Y. Zhou, N. N. Halder, M. K. Hudait, **P. Banerji** and S. Priya, Integration of lead-free ferroelectric on HfO_2/Si (100) for high performance non-volatile memory applications, **Scientific Reports 5**, 8494 (2015).

94. N. N. Halder, P. Biswas, **P. Banerji**, S. Kundu, B. Nagabhushan, K. Sarkar, S. Chowdhury and A. Chaudhuri, Photovoltaic conversion of visible spectrum by GaP capped InP quantum dots grown on Si (100) by metalorganic chemical vapor deposition, **Applied Physics Letters 106**, 012103 (2015).

93. K. Sarkar, K. J. Sarkar and **P. Banerji**, Synthesis of graphene oxide–silver nanocomposite with photochemically grown silver nanoparticles to use as a channel material in thin film field effect transistors, **RSC Advances** 5, 107811 (2015).

92. Sk Masiul Islam, K. Sarkar, P. Banerji, K. J. Sarkar and B. Pal, Leakage current characteristics in MOCVD grown InAs quantum dot embedded GaAs metal-oxide-semiconductor capacitor**, RSC Advances 5**, 83837 (2015).

91. K. Sarkar, M. Palit, **P. Banerji**, S. Chattopadhyay, N. N. Halder, P. Biswas, B. Nagabhusana and S. Chowdhury, Silver catalyzed growth of $In_xGa_{1-x}As$ nanowires on Si (001) by metal–organic chemical vapor deposition, **CrystEngComm** 17, 8519 (2015).

90. Sk Masiul Islam and **P. Banerji**, Size effect of InAs quantum dots grown by metal organic chemical vapor deposition technique in storing electrical charges for memory applications, **RSC Advances 5**, 6906 (2015).

89. S. Pati, **P. Banerji** and S. B. Majumder, Properties of indium doped nanocrystalline ZnO
thin films and their enhanced gas sensing performance, **RSC Advances 5**, 61230 (2015).

88. N. N. Halder, P. Biswas, S. Kundu and **P.Banerji**, Au/p-Si Schottky junction solar cell: Effect of barrier height modification by InP quantum dots, **Solar Energy Materials & Solar Cells** 132, 230 (2015).

87. T. K. Das, A. Mitra, S. K. Mandal, R. K. Roy, P. Banerji and A.K. Panda, Parametric controls on giant magnetoimpedance (GMI) behaviour of CoFeSiBCr amorphous wires for prospective sensor applications, **Sensors and Actuators A: Physical** 220, 382 (2014).

86. S. Mahaboob Jilani and **P. Banerji**, Graphene oxide - zinc oxide nanocomposite as channel layer for thin film transistors: effect of zinc oxide loading on field effect transport, **ACS Applied Materials & Interfaces**, 6, 16941 (**2014).**

85. S. Pati, **P. Banerji** and S.B. Majumder, n- to p- type carrier reversal in nanocrystalline indium doped ZnO thin film gas sensors, **International Journal of Hydrogen Energy 39**, 15134 (2014).

84. S. Pati and **P. Banerji**, Effect of temperature on the structural and morphological characteristics of ZnO thin films grown by MOCVD technique, **International Journal of Computer & Mathematical Sciences** 3, 76 (2014).

83. A. Kumar, P.K. Rawat and **P. Banerji**, Carrier transport phenomenon and thermoelectric properties in melt-grown tellurium doped n-type $Bi_{0.88}Sb_{0.12}$ alloy, **Materials Science & Engineering B** 186, 112 (2014).

82. S. Pati, A. Maity, **P. Banerji** and S.B. Majumder , MOCVD grown ZnO thin film gas sensors: Influence of microstructure, **Sensors & Actuators: A. Physical** 213, 52 (2014).

81. N. N. Halder, P. Biswas, B. Nagabhushan, S. Kundu, D. Biswas, and **P. Banerji**, Effect of band offset on carrier transport and infrared detection in InP quantum dots/Si nano-heterojunction grown by metalorganic chemical vapor deposition technique, **Journal of Applied Physics** 115, 203719 (2014).

80. P. Biswas, N. N. Halder, S. Kundu, **P. Banerji**, T. Shripathi, and M. Gupta, Anomalous diffusion of Ga and As from semi-insulating GaAs substrate into MOCVD grown ZnO films as a function of annealing temperature and its effect on charge compensation, **AIP Advances** 4, 057108 (2014).

79. P. K. Rawat, B. Paul and **P. Banerji**, Exploration of Zn resonance levels and thermoelectric properties in iodine doped PbTe with ZnTe nanostructures, **ACS Applied Materials & Interfaces** 6, 3995 (2014).

78. S. Pati, P. Banerji and S. B. Majumder, Investigation on gas sensing characteristics of textured ZnO thin films grown by wet chemical synthesis, **Advanced Science Letters** 20, 809 (2014).

77. N. N. Halder, S. K. Jana, P. Biswas, **P. Banerji** and D. Biswas, Photoluminescence study based prediction on visible luminescence from n-Zno/p-GaAs heterojunction, **AIP Conference Proceedings** 1591, 1403 (2014).

76. N. N. Halder, P. Biswas, T.D. Das, S.K. Das, S. Chattopadhyay, D. Biswas and **P. Banerji**, Effect of band alignment on photoluminescence and carrier escape from InP surface quantum dots grown by metalorganic chemical vapor deposition on Si, **Journal of Applied Physics**, 115, 043101 (2014).

75. T. K. Das, S. K. Mandal, A. K. Panda, S. Bhattacharya, **P. Banerji** and A. Mitra, Giant magnetoimpedance (GMI) effect and field sensitivity of ferrofluid coated $Co_{66}Fe_2Si_{13}B_{15}Cr_4$ soft magnetic amorphous microwire, **Physics Procedia** 54, 16 (2014).

74. P. K. Rawat and **P. Banerji**, The effect of microstructure and metal-oxide barriers on carrier transport in top-down processed, low density nanograined n-type PbTe, **RSC Advances** 4, 29818 (2014).

73. S. Pati, A. Maity, **P. Banerji** and S.B. Majumder, Qualitative and quantitative discrimination of gases by ZnO thin film gas sensors using pattern recognition analysis, **Analyst** 139, 1796 (2014).

72. Sk Masiul Islam, **P. Banerji** and S. Banerjee, Electrical bistability, negative differential resistance and carrier transport in flexible organic memory device based on polymer bilayer structure, **Organic Electronics 15**, 144 (2014).

71. S. M. Islam, P. Biswas and **P. Banerji**, R. Mukherjee, Low temperature MOCVD growth of high density and defect free InAs quantum dots on (100) p-GaAs substrates for nonvolatile flash memory applications, **Journal of Nanoscience Letter** 4, 26 (2014).

70. S. Mahaboob Jilani, T. D. Gamot, **P. Banerji** and S. Chakraborty, Studies on resistive switching characteristics of aluminum/graphene oxide/semiconductor nonvolatile memory cells, **Carbon** 64, 187 (2013).

69. S. Kundu, S. R. Gollu, R. Sharma, N. N. Halder, P. Biswas, **P. Banerji** and D. Gupta, GaAs metal-oxide-semiconductor based nonvolatile memory devices embedded with ZnO quantum dots, **Journal of Applied Physics** 114, 084509 (2013).

68. S. Adhikari and **P. Banerji**, Poly (aniline-co-m-aminobenzoic acid) deposited on poly (vinyl alcohol): Synthesis and characterization, **Bulletin of Materials Science** 36, 641 (2013).

67. S. Pati, A. Maity, **P. Banerji** and S. B. Majumder Temperature dependent donor-acceptor transition of ZnO thin film gas sensor during butane detection, **Sensors and Actuators B: Chemical 183**, 172 (2013).

66. P. K. Rawat, B. Paul and **P. Banerji**, Thermoelectric properties of $PbSe_{0.5}Te_{0.5}$:*x* (PbI_2) with endotaxial nanostructures: a promising n-type thermoelectric material, **Nanotechnology 24**, 215401 (2013).

65. P. Biswas, S. Kundu and **P. Banerji**, A study on electrical transport vis-à-vis the effect of thermal annealing on the p-type conductivity in arsenic-doped MOCVD grown ZnO in the temperature range 10–300 K, **Journal of Alloys and Compounds 552**, 304 (2013).

64. P. Biswas, S. Kundu and **P. Banerji**, S. Bhunia, Super rapid response of humidity sensor based on MOCVD grown ZnO nanotips array, **Sensors and Actuators B: Chemical 178**, 331(2013).

63. P. K. Rawat, B. Paul and **P. Banerji**, Lead telluride based thermoelectrics: approaches for higher efficiency: in Materials and processes for energy: communicating current research and technological developments, Edited by A. Mendez-Vilas (**Formatex**, Spain, 2013)

62. S. Chowdhury, N.N. Halder and **P. Banerji**, Growth and characterization of MOCVD grown gallium phosphide nanostructures on silicon substrates, **Advanced Materials Research 716**, 281 (2013).

61. P. K. Rawat, B. Paul and **P. Banerji**, Impurity-band induced transport phenomenon and thermoelectric properties in Yb doped $PbTe_{1-x}I_x$, **Physical Chemistry Chemical Physics** 15, 16686 (2013).

60. S. Kundu, N. N. Halder, P. Biswas, D. Biswas and **P. Banerji**, Rabibrata Mukherjee, and S. Chakraborty, Charge storage properties of InP quantum dots in GaAs metal-oxide-semiconductor based nonvolatile flash memory devices, **Applied Physics Letters 101**, 212108 (2012).

59. P. K. Rawat, B. Paul, and **P. Banerji,** An alternative approach for optimal carrier concentration towards ideal thermoelectric performance, **Physica Status Solidi – Rapid Research Letters 6**, 481 (2012).

58. N. N. Halder, S. Kundu, R. Mukherjee, D. Biswas and **P. Banerji**, Catalyst-free direct growth of InP quantum dots on Si by MOCVD: a step toward monolithic integration, **Journal of Nanoparticle Research 14**, 1279 (2012).

57. S. Mahaboob Jilani, T. D. Gamot and **P. Banerji**, Thin-Film Transistors with a Graphene Oxide Nanocomposite Channel, **Langmuir 28**, 16485 (2012).

56. S. Kundu, Y. Anitha, S. Chakraborty and **P. Banerji**, Interface studies on high-k/GaAs MOS capacitors by deep level transient spectroscopy, **Journal of Vacuum Science and Technology B 30**, 051206 (2012).

55. S. Kundu, N.N. Halder, D. Biswas, **P. Banerji**, T. Shripathi and S. Chakraborty, Role of ultra thin pseudomorphic InP layer to improve the high-k dilectric/GaAs interface in realizing metal-oxide-semiconductor capacitor, **Journal of Applied Physics 112**, 034514 (2012).

54. S. Pati, S.B. Majumder and **P. Banerji**, Role of oxygen vacancy in optical and gas sensing characteristics of ZnO thin films, **Journal of Alloys and Compounds 541**, 376 (2012).

53. S. Kundu, A. Kumar, S. Banerjee and **P. Banerji**, Electrical properties and barrier modification of GaAs MIS Schottky device based on MEH-PPV organic interfacial layer, **Materials Science in Semiconductor Processing 15**, 386 (2012).

52. S. Chatterjee, S. Banerjee and **P. Banerji**, New Polymer acceptor for solar cells application, **Synthetic Metals 162**, 566 (2012).

51. S. Kundu, T. Shripathi and **P. Banerji**, Interface engineering with an MOCVD grown ZnO interface passivation layer for ZrO_2 – GaAs metal – oxide – semiconductor devices, **Solid State Communications 151**, 1881 (2011).

50. S. Kundu, S. K. Roy, **P. Banerji**, GaAs metal-oxide-semiconductor device with titanium dioxide as dielectric layer: effect of oxide thickness on the device performance, **Journal of Physics D: Applied Physics 44,** 155104 (2011)**.**

49. B. Paul and **P. Banerji**, The effect of chromium impurity on the thermoelectric properties of PbTe in the temperature range 100 – 600 K, **Journal of Applied Physics 109**, 103710 (2011).

48. B. Paul, P.K. Rawat and **P. Banerji**, Dramatic enhancement of thermoelectric power factor in PbTe:Cr co-doped with iodine, **Applied Physics Letters 98**, 262101 (2011).

47. S. Mangal, P. Ghelfi, A. Bogoni, and **P. Banarji**, Barrier height dependence of Fano factor and 1/f noise effect on InGaP based Schottky barrier diode, J**ournal of Applied Physics 110**, 033721 (2011).

46. S. Kundu, S. Roy, S. Chakraborti, T. Shripathi and **P. Banerji**, Studies on Al/ZrO_2/GaAs metal-oxide-semiconductor capacitors and determination of its electrical and dielectric properties in the frequency range 10 kHz to 1 MHz, J**ournal of Vacuum Science & Technology B 29**, 031203 (2011).

45. S. Adhikari, J. Singh, R. Banerjee and **P. Banerji**, Ester Sensing with Poly (Aniline-co-m-aminobenzoic Acid) Deposited on Poly (Vinyl Alcohol), **Sensors & Transducers Journal 125**, 177 (2011).

44. S. Chatterjee, S. Banerjee and **P. Banerji**, Synthesis and characterization of fluorene based –conjugated ter-copolymers, **Synthetic Metals 161**, 263 (2011).

43. S. Adhikari, J. Singh, R. Banerjee and **P. Banerji**, Camphorsulfonic acid doped polyaniline for detection of terpenes released by plants after pest attack, **Sensor Letters** 9, 1807 (2011).

42. Shyambo Chatterjee, Susanta Banerjee and **P. Banerji**, Synthesis of Fluorene Based new Ter-Copolymers: Electrochemical and Optical Properties, **Journal of Macromolecular Science, Part A: Pure and Applied Chemistry** 48, 780 (2011).

41. S. Chatterjee, S.K. Sen, S. Maji, B. Dasgupta, **P. Banerji** and S. Banerjee, Benzotrifluoromethyl group-substituted poly(para-phenylenevinylene): effect on solubility, optical and electrical properties, **Journal of Applied Polymer Science 116**, 1603 (2010).

40. R. Sharma, B. Paul and **P. Banerji**, Current transport through InP/InSb heterojunction: effect of lattice mismatch, **Applied Surface Science 256**, 2232 (2010).

39. S. Majumdar and **P. Banerji**, Hopping conduction in nitrogen doped ZnO in the temperature range 10 – 300 K, **Journal of Applied Physics 107**, 063702 (2010).

38. S. Majumdar and **P. Banerji**, Temperature dependent hopping conduction in lithium-doped zinc oxide in the range 10-300 K, **Applied Physics A 100**, 487 (2010).

37. S. Adhikari and **P. Banerji**, Enhanced conductivity in iodine doped polyaniline thin film formed by thermal evaporation, **Thin Solid Films 518**, 5421 (2010).

36. P. Kumar, S. Adhikari and **P. Banerji**, Fabrication and characterization of polyaniline/porous silicon heterojunction, **Synthetic Metals 160**, 1507 (2010).

35. B. Paul, Ajay Kumar V and **P. Banerji**, Embedded Ag-rich nanodots in PbTe: Enhancement of thermoelectric properties through energy filtering of the carriers, **Journal of Applied Physics, 108,** 064322 (2010).

34. S. Majumdar and **P. Banerji**, Temperature dependent electrical transport in p-ZnO/n-Si heterojunction formed by pulsed laser deposition, **Journal of Applied Physics 105**, 043704 (2009).

33. S. Majumdar, S. Chattopadhyay and **P. Banerji**, Electrical Characterization of p-ZnO/p-Si heterojunction, **Applied Surface Science 255**, 6141 (2009).

32. B. Paul and **P. Banerji**, Optical and electrical properties of as-grown single crystalline PbTe, **Journal of Crystal Growth 311**,1260 (2009).

31. B. Paul and **P. Banerji**, Controlled synthesis of lead telluride nanocrystals, **Advanced Materials Research 67**, 251 (2009).

30. S. Majumdar and **P. Banerji**, Growth and characterization of urea doped p-type ZnO thin film grown by pulsed laser deposition, **Advanced Materials Research 67**, 127 (2009).

29. S. Majumdar and **P. Banerji**, Effect of Li incorporation on the structural and optical properties of ZnO, **Superlattices and Microstructures 45**, 583 (2009).

28. S. Mangal and **P. Banerji**, GaAs Schottky barrier diodes: the effects of temperature and carrier concentrations, **Journal of Applied Physics 105**, 083709 (2009).

27. S. Majumdar and **P. Banerji**, Moisture sensitivity of p-ZnO/n-Si heterostructure, **Sensors and Actuators B: Chemical 140**, 134 (2009).

26. S. Mangal, S. Adhikari and **P. Banerji**, Aluminium/polyaniline/GaAs metal-insulator-semiconductor solar cell: effect of tunneling on device performance, **Applied Physics Letters 94**, 223509 (2009).

25. B. Paul and **P. Banerji**, Grain structure induced thermoelectric properties in PbTe nanocomposites, **Nanoscience and Nanotechnology Letters 1**, 208 (2009).

24. S. Adhikari and **P. Banerji**, Polyaniline composite by in situ polymerization on a swollen PVA gel, **Synthetic Metals 159**, 2519 (2009).

23. J.K. Mishra, S. Bhunia, S. Banerjee and **P. Banerji**, Photoluminescence studies on porous silicon/polymer heterostructure, **Journal of Luminescence 128**, 1169 (2008).

22. **P. Banerji**, Microstructure characterization of porous silicon as studied by positron annihilation measurements at low temperatures and high vacuum, **Applied Surface Science 253**, 5129 (2007).

21. S. Bhunia, **P. Banerji**, T.K. Chaudhuri, A.R. Haldar, D.N. Bose, Y. Aparna, M.B. Chhetri and B.R. Chakraborty, Optimisation of growth of InGaAs/InP quantum wells using photoluminescence (PL) and secondary ion mass spectroscopy (SIMS), **Bulletin of Materials Science 23**, 207 (2000).

20. D. N. Bose, **P. Banerji**, S. Bhunia, Y. Aparna, M. B. Chetri and B. R. Chakraborty, Determination of well widths in a MOVPE grown InGaAs/InP multi-quantum well structure using SIMS and photoluminescence, **Applied Surface Science 158**, 16 (2000).

19. S. Chakrabarti, B. Das, **P. Banerji**, D. Banerjee and R. Bhattacharya, Bipolaron saturation in polypyrrole, **Physical Review B 60**, 7691 (1999).

18. D. V. Sridhara Rao, K. Muraleedharan, G. K. Dey, S. K. Halder, G. Bhagavannarayan, **P. Banerji**, D. Pal and D. N. Bose, Transmission electron microscopy and X-ray diffraction studies of quantum wells, **Bulletin of Materials Science 22**, 947 (1999).

17. G. S. Mahapatra, C. Haldar, **P. Banerji**, D. Banerjee and R. Bhattacharya, Study of temperature dependence in saccharide-based lyoluminescence, **Journal of Luminescence 78**, 1 (1998).

16. **P. Banerji**, C. Chakraborty and C. K. Sarkar, Longitudinal diffusivity in n-$Hg_{0.8}Cd_{0.2}Te$ in the extreme quantum limit : effect of alloy scattering, **Physical Review B 57**, 15345 (1998).

15. C. Haldar, G. S. Mahapatra, **P. Banerji**, D. Banerjee and R. Bhattacharya, Temperature dependence of lyoluminescent decay in saccharides, **Journal of Luminescence 71**, 131 (1997).

14. **P. Banerji**, C. Chakraborty and C. K. Sarkar, Effect of alloy scattering on the low field microwave mobility in n-$Hg_{0.8}Cd_{0.2}Te$ in the extreme quantum limit, **Physica B 229**, 404 (1997).

13. C. Haldar, G. S. Mahapatra, **P. Banerji**, D. Banerjee and R. Bhattacharya, Effect of solute mass and solvent pH on lyoluminescent saccharides used for gamma-ray dosimetry, **Applied Radiation and Isotopes 48**, 77 (1997).

12. **P. Banerji**, C. Chakraborty and C. K. Sarkar, Alloy scattering limited resistivity in n-$Hg_{0.8}Cd_{0.2}Te$ in the extreme quantum limit : screening effect, **Physical Review B 56**, 1001 (1997).

11. G. S. Mahapatra, C. Haldar, **P. Banerji**, D. Banerjee and R. Bhattacharya, Measurements of low radiation dose by photon counting, **Indian Journal of Pure and Applied Physics 34**, 866 (1996).

10. G. S. Mahapatra, C. Haldar, **P. Banerji**, D. Banerjee and R. Bhattacharya, The decays of lyoluminescent saccharides, **Journal of Luminescence 68**, 205 (1996).

9. **P. Banerji**, H. K. Kundu, D. Banerjee and R. Bhattacharya, Mass effect in radiation-induced lyoluminescence of sugars, **Applied Radiation and Isotopes 45**, 899 (1994).

8. **P. Banerji**, H. K. Kundu, D. Banerjee and R. Bhattacharya, The decays of lyoluminescent alkali halides, **Journal of Luminescence 62**, 109 (1994).

7. **P. Banerji**, D. Banerjee and R. Bhattacharya, Setting up of a photon counter with feeble light from light emitting diode, **Indian Journal of Pure and Applied Physics 32**, 849 (1994).

6. **P. Banerji** and C. K. Sarkar, Effect of band nonparabolicity on the hot electron longitudinal conductivity in n-$Hg_{1-x}Cd_xTe$ in the extreme quantum limit magnetic fields at low temperatures, **Solid State Communications 90**, 325 (1994).

5. **P. Banerji** and C. K. Sarkar, Effect of alloy scattering on the longitudinal hot electron drift velocity in n- $Hg_{0.8}Cd_{0.2}Te$ in the extreme-quantum-limit magnetic fields at low temperatures, **Journal of Applied Physics 75**, 1231 (1994).

4. **P. Banerji** and C. K. Sarkar, Effect of quantum screening on the mobility of n-InSb at low temperatures in the extreme quantum limit, **Physica Status Solidi (b) 179**, K71 (1993).

3. C. K. Sarkar and **P. Banerji**, Effect of alloy scattering on the cyclotron resonance linewidth in $Ga_{0.47}In_{0.53}As$ at low temperatures, **Journal of Physics and Chemistry of Solids 53**, 713 (1992).

2. **P. Banerji** and C. K. Sarkar, Estimation of the alloy scattering strength in $Hg_{0.8}Cd_{0.2}Te$ from the magnetic field dependence of the longitudinal resistivity in the extreme quantum limit, **Journal of Applied Physics 70**, 1467 (1991).

1. C. K. Sarkar and **P. Banerji**, Estimation of the alloy scattering potential in $Ga_{0.47}In_{0.53}As$ using cyclotron resonance measurements, **Physica Status Solidi (b) 156**, K145 (1989).

Annexure – II

Highlights of contributions to the area of specializations:

(i) (a) Successfully completed fabrication of 1.55 μm sources for fibre-optic communication under National Laser Programme using MOCVD grown InGaAs/InP quantum wells. The materials were grown in IIT Kharagpur and the processing was done in TIFR, Mumbai.

(b) Fabrication of InP quantum dot, and intermediate band solar cell for higher energy conversion using InAs quantum dots on GaAs [Ref: **Applied Physics Letters 106**, 012103 (2015), **Solar Energy Materials & Solar Cells** 132, 230 (2015)].

(c) For a long time growth of III-V materials using MOCVD technique has been undertaken for different applications, such as GaAs based MOS, photovoltaics, and memory devices. Growth of Ga, In, As & P containing binary, ternary, quaternary epitaxial films and low dimensional structures such as quantum wells and quantum dots are routinely made using MOCVD system. [Ref: **Applied Physics Letters 101**, 212108 (2012); **Journal of Applied Physics 112**, 034514 (2012); **Journal of Vacuum Science and Technology B 30**, 051206 (2012); **Nanostructured Materials for Electronics, Energy and Environmental Applications** (ed. V. Rajendran, B. Hillbrands, K. Thyagarajah and K.E. Geckeler), Macmillan Publishers; **Journal of Nanoparticle Research 14**, 1279 (2012); **Journal of Physics D: Applied Physics 44,** 155104 (2011); **Solid State Communications 151**, 1881 (2011); J**ournal of Vacuum Science & Technology B 29**, 031203 (2011); **Applied Surface Science 158**, 16 (2000); **Bulletin of Materials Science 23**, 207 (2000); **Bulletin of Materials Science 22**, 947 (1999)].

(ii) A strategy involving the coincidence of Fermi level with the enhanced density of states in PbTe doubly doped with chromium and iodine leads to 135% enhancement in thermopower achieving a high power factor of 56.16 x 10^{-4} $Wm^{-1}K^{-2}$ at 500 K. Such high value of power factor can produce thermoelectric figure of merit (ZT) above 2.0. Here the effect of energy barrier filtering, nanoinclusion and nanoclustering have been incorporated for higher power factor. This value is the highest reported till date in iodine doped $Pb_{1-x}Cr_xTe$ material

system. The optimization of carrier concentration for higher thermoelectric figure of merit has been experimentally shown with different doping. [Ref: **Journal of Applied Physics, 108,** 064322 (2010); **Journal of Applied Physics** 109, 103710 (2011); **Applied Physics Letters 98**, 262101 (2011); **Physica Status Solidi – Rapid Research Letters 6**, 481 (2012); **Nanotechnology 24**, 215401 (2013); **Physical Chemistry Chemical Physics** 15, 16686 (2013); **RSC Advances** 4, 29818 (2014); **ACS Applied Materials & Interfaces** 6, 3995 (2014)].

(iii) Recently research on graphene based materials for electronic applications are undertaken. Materials such as grapheme oxide and graphene oxide nanocomposites are used for fabricating thin film transistors (TFT) and nonvolatile memory devices. [Ref: **Langmuir 28**, 16485 (2012), **Carbon** 64, 187 (2013); **ACS Applied Materials & Interfaces** 6, 16941 (2014); **Journal of Physics and Chemistry of Solids**, 122, 137 (2018); ACS Omega 4, 4312 (2019)].

(iv) Fabrication of non-volatile memory devices using various strategies for achieving higher memory window. [Ref: **Scientific Reports 5**, 8494 (2015); **Scientific Reports** (accepted, 29 June 2015); **RSC Advances 5**, 6906 (2015); **Journal of Applied Physics** 114, 084509 (2013); **Applied Physics Letters 101**, 212108 (2012)].

(v) Guided 22 Ph.D. and 30 Masters Theses. Currently supervising 6 more students for their Ph.D.

Annexure - III

Prof. Pallab Banerji
Ph. D. supervision:
Completed: 22, On-going: 06

(1) Ms. Sayanee Majumder: Structural, optical and electrical properties of lithium and nitrogen doped zinc oxide: (Defence seminar held on: 16th May 2010).

(2) Ms. Sarbani Adhikari: Synthesis, characterization and sensor application of conducting polyaniline and its composites: (28th January 2011).

(3) **Mr. Biplab Paul**: Growth and characterization of bulk and nanostructured lead telluride for thermoelectric applications: (17th May 2011).

(4) **Mr. Sourav Chattopadhyay**: Thin Film Oxides and Heterostructures for Spintronics (as Jt. Supervisor): (27th May 2011).

(5) **Mr. Sutanu Mangal**: Fabrication and characterization of GaAs and InGaP based Schottky barrier diodes and impact of barrier height on device performance: (25th January 2012).

(6) **Mr. Shyambo Chatterjee**: New π-conjugated polymers and their application in photovoltaic devices (as Jt. Supervisor) (submitted on 23rd March 2012).

(7) **Mr. Souvik Kundu**: Effect of interface passivation on the electrical characteristics of GaAs based metal-oxide-semiconductor capacitors (14th January 2013).

(8) **Mrs. Sumati Pati**: Combustible gas sensing characteristics of undoped and indium doped zinc oxide thin films (as Jt. Supervisor) (26th April 2013).

(9) **Mr. Pankaj Kumar Rawat:** effect of nanostructuring and impurity-band on thermoelectric properties in lead teelluride (29th September 2014).

(10) **Mr. Pranab Biswas**: Role of thermally diffused arsenic from semi-insulating GaAs substrate in achieving p-type conductivity in MOCVD grown ZnO (19th September 2014).

(11) **Mr. S. Mahaboob Jilani**: Field effect and charge transport properties of graphene oxide-zinc oxide nanocomposites (7th January 2015).

(12) **Mr. Nripendra Narayan Halder**: Heteroepitaxial growth of indium phosphide quantum dots on silicon (100) by metal organic chemical vapour deposition technique for optoelectronic applications (as Jt. Supervisor) (7th January 2015).

(13) **Mr. Sk Masiul Islam**: Studies on MOCVD Grown InAs Quantum Dots as Charge Storage Elements in GaAs Metal-Oxide-Semiconductor Based Non-volatile Flash Memory Applications (7 October 2015)

(14) **Mr. Tarun Kumar Das**: Giant magnetoimpedance effect in rapidly solidified amorphous wires and their applications in structural integrity assessment of engineering components (as Jt. Supervisor) (19 May 2016)

(15) **Mr. Krishnendu Sarkar**: Silver catalyzed growth of $In_xGa_{1-x}As$ nanowires on group IV substrates by metal organic chemical vapor deposition technique (8 March 2018).

(16) **Ms. Swagata Samanta**: Polymer and silicon waveguide based structures for photonic integrated circuit applications (as Jt. Supervisor): (17 July 2018)

(17) **Mr. Aparabal Kumar**: Studies on electrical and thermal transport properties Cu_3Sbse_4based materials and composites for thermoelectric applications (27 March 2019).

(18) **Ms. Barkha Tiwari**: Biogenic synthesis of pure and Eu^{3+}/Cr^{3+} doped C-$CaIn_2O_4$ hybrid nanostructures with tailored optical, photocatalytic and dielectric properties (as Jt. Supervisor): (30 July 2019).

(19) **Mr. Kalyan Jyoti Sarkar**: Synthesis and characterization of graphene based materials for nonvolatile memory applications (as Jt. Supervisor): (12 March 2020).

(20) **Mr. Sisir Chowdhury**: Growth and Characterization of Gallium Based III-V Low Dimensional Structures on Silicon (December 01, 2021).

(21**) Mr. Biswajit Pal**: Fabrication of Si/InP core-shell nanowire radial heterojunction on etched Si nanowire templates by MOCVD for optoelectronic applications (13 December 2021).

(22) **Ms. Pallavi Dhama**: Studies on electrical and thermal transport properties in In_4Se_3 based materials and composites for thermoelectric application (July 22, 2022).

Annexure - IV

Prof. Pallab Banerji
M. Tech. Guidance:
Completed: 30, On-going 02

(1) Mr. Ravikant Sharma (2007): MOCVD Growth of InP on InP and Vertical Bridgman Grown InSb substrates.

(2) **Mr. Jayanta Kumar Mishra (2007)**: Studies on MEH-PPV/porous silicon heterojunctions.

(3) **Mr. RamSevak Singh (2008)**: MOCVD Growth and characterization of ZnO on sapphire and silicon substrates.

(4) **Mr. Pawan Kumar (2009)**: Studies on polyaniline/porous silicon heterojunction.

(5) **Mr. S. Mahaboob Jilani (2009)**: MOCVD growth and electrical characterization of InP p-n junction diodes.

(6) **Mr. Manu Kumar N. (2009)**: Fabrication of plasma polymerization reactor and polymer synthesis (Jt. Supervision).

(7) **Mr. Sandip Kumar Roy (2010)**: Fabrication and characterization of GaAs MOS devices with TiO_2 as oxide layer.

(8) **Mr. Ajay Kumar V. (2010)**: Synthesis and characterization of $Ag_{0.01}Pb_{0.99}Te$ nanocomposite and a comparative study with PbTe and $Ag_{0.01}Pb_{0.99}Te$ bulk crystals.

(9) **Mr. Ajit Kumar (2011)**: Fabrication and characterization of ZnO based thin film transistor (TFT).

(10) **Mr. Pankaj Kumar Rawat (2011)**: Bulk growth of lead telluride (PbTe) based high performance thermoelectric materials and its characterization.

(11) **Mr. Sandipta Roy (2011)**: Fabrication & characterization of GaAs based metal-oxide-semiconductor (MOS) devices using lead zirconium titanate (PZT) as high-k dielectric gate material.

(12) **Mr. Tanesh Dinesh Gamot (2012)**: Graphene oxide-Zinc oxide nano composites for Thin Film Transistor applications.

(13) **Mr. B. Nagabhushan (2012)**: Synthesis and Characterization of CZTS nanocrystal ink for Solar Cell applications.

(14) **Ms. Y. Anitha (2012)**: Fabrication and Characterization of Germanium based MOS capacitor with high-K dielectric.

(15) **Mr. Aparabal Kumar (2013)**: Carrier transport studies of melt-grown tellurium doped n-type $Bi_{0.88}Sb_{0.12}$ for low temperature thermoelectric applications.

(16) **Mr. Subodh Tyagi (2014):** Epitaxial growth of CdTe on (211) B GaAs by Molecular Beam Epitaxy (Jt. Supervision).

(17) **Mr. Kalyan Jyoti Sarkar (2014):** Graphite oxide gate dielectric for thin film transistors (Jt. Supervision).

(18) **Mr. Anish Kumar Das (2016)**: Thermoelectric study of ternary phase-change material: Investigation of thermoelectric properties in Sb_2Te_3:Sb_2Se_3 (jointly with Prof. Matthias Wuttig, RWTH Aachen University, Germany)

(19) **Mr. Dharmendra Kumar (2016)**: Growth and characterization of catalyst free ternary $In_xGa_{1-x}As$ nanowires on Si (111) substrates using metal-organic chemical vapour deposition.

(20) **Mr. Hasmat Mondal (2017)**: MOCVD growth of InAs quantum dots and its application in thermoelectricity.

(21) **Mr. Mrinmoy Talukdar (2017)**: Synthesis and study of thermoelectric properties of Tin (Sn), Antimony (Sb), Selenium (Se) based ternary alloys.

(22) **Mr. B. Sandeep Nair (2017):** A study on thermoelectric properties of thin film organic composite with nanohybrid.

(23) **Mr. Soumen Giri (2018)**: Synthesis and thermoelectric properties of Bi doped p-type Cu_3SbSe_3.

(24) **Mr. Major Ishwar Meena (2018)**: Synthesis of pure bismuth ferrite ($BiFeO_3$) and doping of Na and Ga for photovoltaic application.

(25) **Mr. Anay Basak (2018)**: Growth of PEDOT:PSS and Cu_3SbSe_4 composite thin film and optimization of its thermoelectric properties by CNT nano inclusion.

(26) **Mr. Gaurav Pratap Singh (2019**): Electrical and thermal transport properties of melt grown pristine and Sn doped $CuSbSe_2$

(27) **Mr. Rahul Kumar Yadav (2019)**: Synthesis and characterization of Cu_2Se - graphene oxide nanocomposite for nonvolatile memory

(28) **Mr. Prashant Kumar Yadav (2020):** Synthesis and Characterization of II-VI semiconductors nanostructure for optoelectronic applications.

(29) **Mr. Biswajeet Nayak (2021)**: Study of 2D thermoelectric materials.

(30) **Mr. Akash Basu (2022)**: A study on electrical properties of some polymeric films.

Annexure - V

Prof. Pallab Banerji
Sponsored Research Projects: as PI & Co-PI

Title of the Project	Funding Source	From	To	(Rs.)
MOCVD growth of GaAs epitaxial layer for solar cell applications (PI)	IIT, Kharagpur	01-05-2006	30-04-2009	300000
Synthesis and characterization of novel light emitting poly (Arylene)s and poly (Arylene ether)s and derivative thereof (Co-PI)	CSIR, New Delhi	16-08-2007	15-08-2010	906000
Renovation & Repairing of MOCVD Laboratory (PI)	IIT, Kharagpur	03-04-2006	31-03-2007	1500000
MOCVD growth & characterization of InGaP/GaAs and InGaP quantum dot solar cells (PI)	DST, New Delhi	01-09-2007	31-12-2010	3810558
Development of MBE cluster tool based epitaxial nano-semiconductor infrastructure and process integration facility for high performance RF/microwave compound semiconductor heterostructure nano-devices on silicon (Co-PI)	DIT, New Delhi	31-03-2010	30-03-2016	497992000
GaN/InGaN based light emitting diodes, solar cells and photo-electrochemical device by MOCVD process (Co-PI)	DST, New Delhi	12-07-2010	11-07-2015	65609600
Metal-oxide semiconductor (MOS) based non-volatile memory devices using III-V semiconductor quantum dots as charge storage elements on Si substrates (PI)	DST, New Delhi	22-08-2014	21-02-2018	4750000
Novel fabrication of nano structured surfaces and their integration with solar cells (Co-PI)	DST, New Delhi	22-07-2015	30-09-2018	2959000
Fabrication of optical meta materials for cloaking in visible wavelength (Co-PI)	IMPRINT, DST, New Delhi	21-03-2017	20-03-2020	22800000
FIST Program 2016 - Materials Science Centre (as Co-PI)	DST, New Delhi	27-04-2017	26-04-2022	35000000
Socializing the micro-solar dome: empowering marginalized rural SC communities through solar illumination and solar electricity (Co-PI)	SERI, DST	29-03-2019	28-03-2021	47294000

Socializing the micro-solar dome: empowering marginalized rural ST & tribal communities through solar illumination and solar electricity (Co-PI)	SERI, DST	29-03-2019	28-03-2021	68498000
Green synthesis and characterization of biocompatible mulyi-color luminescent carbon dots for bioimaging and/or sensing applications (as Co-PI)	STARS, MHRD	17-01-2020	16-01-2023	4148000
MOCVD growth and p-type doping of Ga_2O_3 solar blind UV photodetector applications	SERB, New Delhi	20-03-2023	19-03-2026	5918000