

Dr. Kanchan Chowdhury

CURRICULUM VITAE

Former Professor
Cryogenic Engineering Centre
Indian Institute of Technology
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Date of Birth: 1st February, 1957
Place of Birth: Mariani, Assam, India
Nationality: Indian, Sex: Male
Marital status: Married. 2 daughters



Areas of Specialization:

- Safety in hospitals and industry
- Prevention of Fire in Oxygen-rich systems
- Refrigeration Technology and Cold Storage
- Cryogenic Air Separation
- Heat Exchanger
- Helium Liquefier and Refrigerator
- On-board reliquefaction and regasification of LNG.

Academic or Professional Awards (Honours):

- DAAD Fellowship of Government of Germany (1983-84) at University of Karlsruhe, Germany.
- Best Poster-paper award at 8th International Heat Transfer Conference at San Francisco, August 17-22, 1986 for the paper "Straight Forward Design Formula for Spiral plate Heat Exchangers", co-authored by Holger Martin.
- BOYS-CAST Fellowship of Government of India (1987-88) at University of Colorado at Boulder, USA (worked at NIST, Boulder).
- Best Technical Paper award at the 21st National Seminar on Industrial Gases, 29th to 30th January 1999, Bangalore, India held under the aegis of All India Industrial Gases Manufacturers' Association (AIIGMA) for the paper "Advances in Cryogenic Air Separation".
- Delivered keynote speech on "Evolution of Cryogenics and its Industrial Applications" at the 4th International Conference on Mechanical Engineering (ICME 2001) held at Dhaka, Bangladesh during December 26-28, 2001.
- Best Technical Paper award at the 25th National Seminar on Industrial Gases, 24th to 25th January, 2003, Pune, India held under the aegis of All India Industrial Gases Manufacturers' Association (AIIGMA) for the paper "Intricacies of Argon Separation in a Cryogenic Air Separation Plants", co-authored by S. N. Sapali.
- Endeavour Executive Fellowship of Government of Australia (2007) at University of Queensland at Brisbane, Australia.
- Best Technical Paper award at the 30th National Seminar on Industrial Gases, February 23rd to 24th, 2008, Bhubaneswar, India, held under the aegis of All India Industrial Gases Manufacturers' Association (AIIGMA) for the paper "Electrostatics: A Possible Cause of Fire in Contaminated Oxygen Systems" co-authored with Aditi Oza.

Editorial Advisory Board Member

Member, Editorial Advisory Board of Elsevier Journal "Applied Thermal Engineering", Since January 2022.

Dr. Kanchan Chowdhury**Referee of Journals:**

1. ASME Journal of Thermal Science and Engineering Applications
2. Heat Transfer Engineering, Published By: Taylor & Francis
3. Journal of ASTM International
4. International Journal of Refrigeration (Elsevier)
5. Cryogenics (Elsevier)
6. Energy (Elsevier)
7. Applied Thermal Engineering (Elsevier)

Academic Qualification:

Degree/ Examination	University /Institution	Year	Discipline	Marks obtained	Division/ /Rank
Doctor of Philosophy (Ph. D.)	Indian Institute of Technology, Kharagpur	1984	Cryogenic Engineering	Thesis title: Cryogenic Heat Exchangers	
Bachelor of Technology (Honours)	Indian Institute of Technology, Kharagpur	1978	Mechanical Engineering	71%	1 st Class
Pre-university (Class 11)	St. Anthony's College, Shillong Guwahati University, Assam	1972	Science	80%	3 rd rank in University
School Leaving Exam (Class 10)	Mariani Railway High School, Assam Board of Sec Education	1971		81%	3 rd rank in Assam

Academic Experience:

University/ Organisation	Designation	From	To	Total Period	Nature of Experience
Indian Institute of Technology, Kharagpur	Professor	August 04	January 22 (to continue till June 22 as reemployed)	18 years	M. Tech and B. Tech Teaching, Ph. D. guidance, Industrial Training,
----ditto-----	Associate Professor	Dec 93	August 04	10 years 8 months	Sponsored Research,
----ditto-----	Asst. Prof.	Jan 87	Dec 93	7 years	Consultation with Industry
----ditto-----	Lecturer	July 84	Dec 86	2 years 6 months	

Experience Abroad:

Physikalisch- Technische Bundesanstalt Braunschweig, Germany	Guest Scientist	May 2011	July 2011	2 months	Research on Electrostatics (Arbeitsgruppe 3.73 Physikalische Zündvorgänge) Dr. Ulrich von Pidoll
Physikalisch- Technische Bundesanstalt Braunschweig, Germany	Guest Scientist	May 2010	July 2010	2 months	Research on Electrostatics (Arbeitsgruppe 3.73 Physikalische Zündvorgänge) Dr. Ulrich von Pidoll

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Queensland University of Technology, Brisbane, Australia	Endeavour Executive Award Winner, DEST, Australia	June 2007	Sept 2007	4 months	Research on Oxygen Compatibility of materials and Safety. Prof. Ted Steinberg
Fachhochschule Frankfurt, Germany	Guest Scientist	Sept. 93	Nov. 93	3 months	Research on G-M Cryorefrigerator Dr. H. H. Klein
National Institute Of Standards and Technology, Boulder, Colorado, USA	Guest Scientist	July 87	March 88	1 year	Research on Pulse Tube Cryorefrigerator. Worked with Dr. Ray Radebaugh
	Ditto	June 88	July 88		
Institut für Thermische Verfahrenstechnik, University of Karlsruhe, Germany	Scientist	May 83	July 84	1 year 3 months	Research on Spiral Heat Exchanger Worked with Prof. Holger Martin

Industrial Experience:

Philips India Limited, Calcutta	Management Trainee	June, 1978	March, 1979	10 months	Production in Light Division
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Administrative Experience:

Head of Cryogenic Engineering Centre for one year (August 2005 to August 2006)
Head of Cryogenic Engineering Centre for 3 years (January 2013 to December 2015)
Chairman, Partha Ghosh Academy of Leadership for 2 years (March 2020-January 2022)

Leadership:

President, IIT Kharagpur Teachers' Association, 2009-10

Teaching Interests (Subjects taught or presently teaching):At the undergraduate level:

Cryogenic Liquefaction and Separation Processes
Cryogenic Refrigeration and Liquefaction Systems
Introduction to Cryogenic Engineering
Introduction to Refrigeration Technology

At the postgraduate level

Cryogenic Liquefaction Systems and Cryocoolers
Basic Refrigeration Technology
Safety Issues with Cryogenic Fluids
Downstream LNG Technology
Cryogenic Air Separation ;

Sponsored Research Projects Undertaken as Principal Investigator:

- A 4.5K station based on Closed Cycle Cryorefrigerator (Department of Science and Technology, Govt. of India) 1986-1988
- Development of Closed Cycle Cryorefrigerator (Department of Science and Technology, Govt. of India) 1991-1994
- Safe Design of Systems with Oxygen-rich Environment (Indian Space Research Organization) 2007 – 09
- Steady State and Dynamic Simulation of kW class helium refrigerator/liquefier for Superconducting magnets used for Fusion Machines (Board of Research in Fusion Sciences-Institute for Plasma Research) 2008 –2011
- Investigation of the effects of tribocharging of solid particles on possible ignitions in gaseous oxygen systems: Experiments and Analyses (Department of Science and Technology, New Delhi) 2009 - 2012.

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Consultancy Projects Undertaken:

- Performance improvement of Air Separation Plant at Alwar, Rajasthan, Air Liquide North India, New Delhi, 1997
- Design, Fabrication and Installation of an all-Stainless Steel Insulated Cryogenic Chamber for Himalayan Rock Testing, 1996 Central Mining Research Institute, Dhanbad
- Design of Cryogenic Heat Exchanger for cooling of GHe and LOX in an LN₂ bath for Indian Space Research Organization, 1997 Shell-n-Tube, Calcutta
- Production Improvement of Air Separation Plant, Gautam Engineers Limited, Calcutta, 1998
- Determination of Appropriate Temperature Condition for Cooling Mango Juice
M/S A Devarya, Consulting Engineer, Bangalore, 1997
- Design of Liquid Oxygen (LOX) Separation System, Ministry of Defense, Defense Research and Development Laboratory, Hyderabad, 2002
- Literature Survey for Liquid Hydrogen, Liquid Nitrogen, Liquid Oxygen on their Physical and Chemical Properties, Compatibilities, Safeties, Storage, Transportation and Handling including Material and Insulation, Ministry of Defense, Defense Research and Development Laboratory, Hyderabad, 2002
- Rendering Technical Services in matters related to Court Arbitration on Cryogenic Air Separation, Praxair India Pvt. Limited, Bangalore, 2006.
- Design of a carbon-di-oxide removal system from a sealed space by using novel adsorbers, Airef Engineers Private Limited, New Delhi, 2008
- Technical interaction and training of engineers in ORYX-GTL Plant at Doha, Qatar, 2013
- Discussion on feasibility of producing SO₃ with pure oxygen and alternative cycle for oxygen production, Greentec India Pvt. Ltd., New Delhi, 2014.
- Technical interaction and training of engineers at IISCO Steel Plant, SAIL, Burnpur, West Bengal, 2014.
- Development of Helium Liquefier at VECC, Kolkata, Department of Atomic Energy, Govt of India), Co-consultant, 2016-19
- Rendered Technical Services in matters related to Court Arbitration on Cryogenic Air Separation, Rashtriya Ispat Nigam Limited (RINL), Vishakhapatnam, 2018-2019.

Doctoral Theses Supervised:

- 1) Matrix Heat Exchanger (completed)
- 2) Steady State and Dynamic Simulation of Cryogenic Distillation Columns (completed)
- 3) Performance of Gifford-McMahon Cryorefrigerators: Development of a Simulator and its Experimental Validation (completed)
- 4) Cryogenic Air Separation Plants: Parametric Evaluation and Exergy Analyses (completed)
- 5) Evaluation of Electrostatic Discharge due to Tribocharging of Contaminant Particles as an Ignition Mechanism in Oxygen System(completed)
- 6) Exergy Approach in Designing Large-scale Helium Liquefiers (completed)
- 7) Dynamic Simulation and Control strategy of helium liquefiers used in fusion reactors (completed)
- 8) Design of energy efficient and eco-friendly boil-off gas reliquefiers of LNG carrier ships (completed)
- 9) Utilization of cold energy of LNG in Organic Rankine Cycle and Cryogenic Air Separation (submitted)
- 10) Improvements in Air Separation Plant through Exergy Analysis (completed)
- 11) Design improvement of ambient atmospheric vaporizer (Submitted)

Languages known:

- Bengali (An Indian language, mother tongue) (read, write and speak)

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- Hindi (Official Indian language) (read and speak)
 - Assamese (An Indian language) (read and speak)
 - English (read, write and speak)
 - German (read and speak)
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List of Papers published in Journals:

1. **Kanchan Chowdhury** and Sunil Sarangi: A Second Law Analysis of the Concentric Tube Balanced Counter flow Heat Exchanger: Optimisation of Wall Conductivity. Proceedings of the Seventh National Symposium on Refrigeration and Air Conditioning, 135-38 (1980).
2. Sunil Sarangi and **Kanchan Chowdhury**: On the Generation of Entropy in a Counterflow Heat Exchanger. Cryogenics Vol. 22, 63-65 (1982).
3. **Kanchan Chowdhury** and Sunil Sarangi: A Second Law Analysis of the Concentric Tube Counter flow Heat Exchanger: Optimisation of Wall Conductivity Int. J. Heat Mass Transfer Vol. 26, 783-86 (1983).
4. **Kanchan Chowdhury** and Sunil Sarangi: Effect of Finite Thermal Conductivity of the Separation Wall on the Performance of Counterflow Heat Exchanger. Cryogenics, Vol. 23, 212-216 (1983).
5. **Kanchan Chowdhury** and Sunil Sarangi: Performance of Cryogenic Heat Exchangers with Heat Leak from the Surroundings. Advances in Cryogenic Engineering, Vol.29, 273-280 (1984).
6. **Kanchan Chowdhury** and Sunil Sarangi: The Effect of Variable Specific Heat of the Working Fluid on the Performance of Cryogenic Heat Exchangers, Cryogenics, Vol. 24, p. 679-80 (1984).
7. **Kanchan Chowdhury** and Sunil Sarangi: The Effect of Flow Maldistribution and Multipassage Heat Exchanger performance. Heat Transfer Engineering, Vol. 6, p. 45-54 (1985).
8. **Kanchan Chowdhury**, M. K. Bassiouny and Holger Martin: Effect of Flow Bypass on the Pressure Drop and Heat Transfer Characteristic in Spiral Plate Heat Exchanger (in German)., Annual Report of the International Seminar in Chemistry and Chemical Engineering, University of Karlsruhe, West Germany (under German Academy Exchange Service Program), 1983-1984.
9. Sanjay Kumar and **Kanchan Chowdhury**: Analysis on a Cross flow Heat Exchanger and Optimisation of Thermal Conductivity of Wall Material. Presented at the International Conference on Cryogenics, Calcutta, Dec. 10-13, 1985. Also published in Indian Journal of Cryogenics, Vol. 12, No.1, pp. 17-31, 1987.
10. **Kanchan Chowdhury**, Helmut Linkmeyer, M. K. Bassiouny and Holger Martin: Analytical Studies on the Temperature Distribution in Spiral Plate Heat Exchanger: Straightforward Design Formula for Efficiency and Mean Temperature Difference. Chemical Engineering and Processes (W. Germany), 19, n4, p. 183-190 (1985).
11. Ray Radebaugh, **Kanchan Chowdhury** and James Zimmerman: Optimisation of a pulse tube refrigerator for a fixed Compressor Swept Volume. Published in the proceedings of the Fifth International Cryocooler Conference, 1988.
12. K.K.A. Rasheed, A.K. Baral and **Kanchan Chowdhury**: Modelling of A Gifford McMahon Cryorefrigerator. Published in Indian Journal of Cryogenics, Vol.19, No.1, p. 1-5, 1994.
13. M. K. Chaurasia, T. K. Goswami and **Kanchan Chowdhury**: Temperature Profile during Cold Storage of Bagged Potatoes: Effects of Geometric and Operating Parameters. Transaction of ASAE, Volume 44, no. 5, page 1345 – 1351, 1999
14. Aditi Oza and **Kanchan Chowdhury**, “Safe Design of Oxygen System Components: A Review”, Indian Journal of Cryogenics, Vol. 31, Pg. 91-95, 2006.
15. Aditi Oza, Sudipto Ghosh and **Kanchan Chowdhury**, CFD Modeling of Globe Valves for Oxygen Application, Conference Proceedings of 16th Australasian Fluid Mechanics Conference, Crown Plaza, Gold Coast, Australia, 2- December 2007.
16. Aditi Oza, Sudipto Ghosh and **Kanchan Chowdhury**, “Tribocharging of Particle Contaminants Evaluated as an Ignition Source in Oxygen-Enriched Environments”, Journal of ASTM International, Vol. 6, No. 8, Paper September 2009, Paper ID: JAI102317 Page count 28.
17. Rijo Jacob Thomas, Sanjay Basak, Parthasarathi Ghosh, and **Kanchan Chowdhury**, “Helium Liquefaction/Refrigeration System Based on Claude Cycle: A Parametric Study”, Indian Journal of Cryogenics, Vol. 34, No. 1-4, pp. 33-38, 2009.
18. Rijo Jacob Thomas, Sanjay Basak, Parthasarathi Ghosh, and **Kanchan Chowdhury**, “Thermodynamic Properties of Helium: A Comparative Study on Different Equations of State”, Indian Journal of Cryogenics, Vol. 35, No. 1-4, pp. 240-245, 2010.

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19. **Kanchan Chowdhury**, Rijo Jacob Thomas, Parthasarathi Ghosh, and B. Sarkar, "Large-Scale Helium Liquefier/Refrigerator for Fusion Devices: A Global Review and Indian Perspective Planning", *Indian Journal of Cryogenics*, Vol. 35, No. 1-4, pp. 321-326, 2010.
20. Aditi Oza, Sudipto Ghosh and **Kanchan Chowdhury**, "Triboelectrification of Metallic Dust Particles: Experiment and Modeling", *Journal of ASTM International*, Vol. 8, Issue 1, 2011.
21. Aditi Oza, Sudipto Ghosh and **Kanchan Chowdhury**, "Modeling of Dispersion and Settling of Micron-Sized Dust Particles in Pressure Regulator Used in Oxygen-Enriched Environment", *Journal of ASTM International*, Vol. 8, Issue 4, 2011.
22. **Kanchan Chowdhury**, "Fire in High Pressure Oxygen Filter: Analysis of an Accident in a Steel Plant", *Journal of ASTM International*, Vol. 8, Issue 7, 2011.
23. Rijo Jacob Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Exergy analysis of helium liquefaction systems based on modified Claude cycle with two-expanders", *Elsevier: Cryogenics* 51, No. 6, pp. 287-294, 2010.
24. Rijo Jacob Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Role of Expanders in Helium Liquefaction Cycles; Parametric Studies Using Collins Cycle", *Elsevier: Fusion Engineering and Design* 86, pp. 318-324, 2011.
25. Rijo Jacob Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Role of Heat Exchangers in Helium Liquefaction Cycles; Simulation Studies Using Collin's Cycle", *Elsevier: Fusion Engineering and Design Journal* 87, pp. 39-46, 2011.
26. Rijo Jacob Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Thermodynamic Analysis of Collin's Cycle: Aspects of Designing Large Scale Helium Liquefiers", Published in *Proceedings of ICEC 23* Edited by Maciej Chorowski et al., pp. 291-297, 2011.
27. Rijo Jacob Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Application of Exergy Analysis in Designing Helium Liquefiers", *Elsevier: Energy* 37(1), pp. 207-219, 2012.
28. Rijo Jacob Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Exergy based analysis on different expander arrangements in helium liquefiers", *Elsevier: International Journal of Refrigeration*, Volume 35, Issue 4, pp.1188–1199, June 2012.
29. Rijo Jacob Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Exergy Analysis of Different Cold End Configurations for Helium Liquefiers", *ASME:Thermal Science and Engineering Applications*, Vol. 4, 021009/11 pages, June 2012.
30. Rijo Jacob Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Applicability of Simpler Equations of State for Modeling Helium Systems", *Elsevier: Cryogenics*, Volume 52, Issues 7–9, pp. 375–381, July–September 2012.
31. Rohan Dutta, Parthasarathi Ghosh and **Kanchan Chowdhury**, "Application of parallel heat exchangers in helium refrigerators for mitigating effects of pulsed load from fusion devices". *Elsevier: Fusion Engineering and Design*, 86(4-5):296-30, 2011.
32. Rohan Dutta, Parthasarathi Ghosh and **Kanchan Chowdhury**, "Customization and validation of a commercial process simulator for dynamic simulation of helium liquefier", *Energy*, 36(5):3204-14, 2011.
33. Rijo J Thomas, Rohan Dutta, Parthasarathi Ghosh, and **Kanchan Chowdhury**. "Applicability of simpler equations of state for modeling helium systems", *Cryogenics*, 52:375-381, 2012.
34. **Kanchan Chowdhury**, Ulrich von Pidoll, Dieter Moeckel, Tim Langer and Michael Beyer, "Interpretation of charge transfer measurements of brush discharges", *Proceedings of 13th International Conference on Electrostatics*, IOP Publishing, *Journal of Physics: Conference Series* 301 (2011) 012041 DOI:10.1088/1742-6596/301/1/012041, 2011.
35. **Kanchan Chowdhury** and Ulrich von Pidoll, "Experimental Investigation on the Measurement Deviations in Recording Brush Discharges from Insulating Surfaces by Coulombmeters", *Journal of Electrostatics*, Elsevier, Volume 70, Issue 4, August 2012, Pages 347–355.
36. Rohan Dutta, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Mitigation of effects of pulsed heat loads in helium refrigerators for fusion devices using supercritical helium storage", *IEEE Transaction on Applied Superconductivity*, DOI: 10.1109/TASC.2012.2218592, 22(6), 2012.
37. Arpan Kundu, Rijo Jacob Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Exergy Analysis to Determine Appropriate Design and Operating Parameters for Collins Refrigerator-Liquefier under Mixed Mode Operation", *Proceedings of the 12th cryogenics 2012, IIR International Conference*, Dresden, Germany. Sep 11-14,2012, ISBN 978-2-913149-93-9, ISSN 0151-1637, pp. 233-239.

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38. Ulrich von Pidoll and **Kanchan Chowdhury**, "Predicting the electrostatic charging behavior of insulating materials without charging tests", presented at Electrostatics 2013: 12th International Conference on Electrostatics, 17-19 April 2013, Budapest, Hungary.
39. Ulrich von Pidoll and **Kanchan Chowdhury**, "Predicting the electrostatic charging behavior of insulating materials without charging tests", Journal of Electrostatics, Volume 71, Issue 3, June 2013, Pages 513–516
40. Rohan Dutta, Parthasarathi Ghosh, and **Kanchan Chowdhury**. "Performance of large-scale helium refrigerators subjected to pulsed heat load from fusion devices", Presented in International Cryogenic Engineering Conference & 24-International Cryogenic Materials Conference, Fukuoka, Japan, May 14-18, 2012. Published in Proc. of 24-ICEC/ICMC-2012, 2013.
41. Rohan Dutta, Rijo J Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**. "Dynamic simulation of large-scale helium liquefier using Aspen Hysys®: Problems, solutions and prospect", 23rd National Symposium on Cryogenics, NIT Rourkela, India, October 28-30, 2010. Published in Indian Journal of Cryogenics, 38(1-2):166-172 (2013).
42. Parthasarathi Ghosh, Rijo J Thomas, Rohan Dutta and **Kanchan Chowdhury**. "Design and Analysis of Large-scale Helium Liquefiers/Refrigerators: Issues with Modeling and Simulation", 23rd National Symposium on Cryogenics, NIT Rourkela, India, October 28-30, 2010. Published in Indian Journal of Cryogenics, 37(1-4):9-16 (2012).
43. Rohan Dutta, Parthasarathi Ghosh, and **Kanchan Chowdhury**. "Mitigation of Effects of Pulsed Heat Load from Fusion Devices on Helium Refrigerator: A Novel Technique using Vapor Compression Cycle", International Journal of Refrigeration, Vol. 36, No. 6, pp 1776-1789, 2013.
44. Rohan Dutta, Parthasarathi Ghosh, and **Kanchan Chowdhury**. "A cycle configuration for large-scale helium refrigerator for fusion devices towards complete mitigation of the effects of pulsed heat load", Fusion Engineering and Design, Vol. 88, pp. 2972– 2982: Impact factor-1.49 (2013).
45. Rijo Jacob Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Optimum number of stages and intermediate pressure level for highest exergy efficiency in large helium liquefiers", International Journal of Refrigeration. Volume 36, Issue 8, December 2013, Pages 2438–2457.
46. Rijo Jacob Thomas, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Exergy Analysis of large scale Helium Liquefies: Evaluating Design Trade-offs", Proceedings of the CEC/ICMC, Advances in Cryogenic Engineering Vol 59A, 2013.
47. Rohan Dutta, Parthasarathi Ghosh, and **Kanchan Chowdhury**, "Identification of critical equipment and determination of operational limits in helium refrigerators under pulsed heat load", Cryogenics (Elsevier), Volume 59, January–February 2014, Pages 23–37.
48. Arpan Kundu and **Kanchan Chowdhury**, "Evaluating performance of mixed mode multistage helium plants for design and off-design conditions by exergy analysis", International Journal of Refrigeration, Volume 38, February 2014, Pages 46–57.
49. **Kanchan Chowdhury**, Fires in Indian hospitals: Root cause analysis and recommendations for their prevention, Journal of Clinical Anesthesia, Elsevier, August 2014, Volume 26, Issue 5, Pages 414–424.
50. Sarun Kumar Kochunni, Parthasarathi Ghosh and **Kanchan Chowdhury**, Optimization of UA of heat exchangers and BOG compressor exit pressure of LNG boil-off gas reliquefaction system using exergy analysis, Presented in Cryogenic Engineering Conference / International Cryogenic Materials Conference, Arizona, USA, June 28-July 2, 2015. Published in IOP Conf. Series: Materials Science and Engineering, 2015, Volume 101.
51. **Kanchan Chowdhury**, Fatal Accident from an Oxygen Fire at an Indian Steel Plant in 2012: Unresolved Questions, 14th International Symposium on Flammability and Sensitivity of Materials in Oxygen-Enriched Atmospheres, San Antonio, USA, April 13-15, 2016 and published in Journal of ASTM International Selected Technical Papers STP 1596, 2016 / available online at www.astm.org / doi: 10.1520/STP159620150068.
52. Sarun Kumar Kochunni and **Kanchan Chowdhury**, Comparison between reverse Brayton and Kapitza based LNG boil-off gas reliquefaction system using exergy analysis, Presented in 26th International

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- Cryogenic Engineering Conference/ International Cryogenics Material conference, New Delhi, India, March 7-11, 2016, Published in IOP Conf. Series: Materials Science and Engineering, Volume 171, 2017 doi:10.1088/1757-899X/171/1/012009.
- 53 Rohit Singla and **Kanchan Chowdhury**, Mitigating an increase of specific power consumption in a cryogenic air separation unit at reduced oxygen production, Presented in 26th International Cryogenic Engineering Conference/ International Cryogenics Material conference, New Delhi, India, March 7-11, 2016, Published in IOP Conf. Series: Materials Science and Engineering, Volume 171, 2017 doi:10.1088/1757-899X/171/1/012016.
- 54 Singla Rohit and **Chowdhury Kanchan**, Identification of deteriorated components in an air separation plant and evaluating their impact on overall performance through steady state simulation, Presented and published in proceedings of the 14th cryogenics 2017, IIR International Conference, Dresden, Germany, May 15-19, 2017, DOI: 10.18462/iir.cryo.2017.086
- 55 Joy Jubil and **Chowdhury Kanchan**, Comparison of direct expansion and combined direct expansion and organic Rankine cycle for power generation by utilizing LNG cold energy, Presented and published in proceedings of the 14th cryogenics 2017, IIR International Conference, Dresden, Germany. May 15-19, 2017, DOI: 10.18462/iir.cryo.2017.087
- 56 Kochunni Sarun Kumar and **Chowdhury Kanchan**, Analysis of cascade cycle and reverse Brayton cycle based bog reliquefaction systems for their suitability in LNG carrier ships with dual fuel engines, Presented and published in proceedings of the 14th cryogenics 2017, IIR International Conference, Dresden, Germany, May 15-19, 2017, DOI: 10.18462/iir.cryo.2017.087
- 57 Posa Lokesh, Ghosh Parthasarathi and **Kanchan Chowdhury**, Analysis for a safer design of high pressure oxygen pressure reducing stations in steel plants, Presented and published in proceedings of the 12th cryogenics 2012, IIR International Conference, Dresden, Germany, May 15-19, 2017, DOI: 10.18462/iir.cryo.2017.091.
- 58 L Ratna Raju, S Sunil Kumar, **K Chowdhury** and T K Nandi: Heat transfer and flow friction correlations for perforated plate matrix heat exchangers, Presented in 26th International Cryogenic Engineering Conference/ International Cryogenics Material conference, New Delhi, India, March 7-11, 2016, Published in IOP Conf. Series: Materials Science and Engineering, Volume 171, 2017 doi:10.1088/1757-899X/171/1/012085.
- 59 Rohan Dutta, Parthasarathi Ghosh, and **Kanchan Chowdhury**. Process Configuration of Liquid-nitrogen Energy Storage System (LESS) for Maximum Turnaround Efficiency, Cryogenics (Elsevier) Volume 88, December 2017, Pages 132-142
- 60 Kochunni Sarun Kumar and **Chowdhury Kanchan**, Utilization of engine exhaust gas in boil-off gas reliquefaction system of a LNG carrier ship, Presented and published in proceedings of the 15th cryogenics 2019, IIR International Conference, Prague, Czech Republic, April 08 - 11, 2019. DOI: 10.18462/iir.cryo.2019.0035
61. Singla R., Chowdhury K., Improving specific power consumption of cryogenic air separation plants using waste heat of carbon capture power; Cryogenics 2019. Proceedings of the 15th IIR International Conference: Prague, Czech Republic, April 8-11, 2019. DOI: <http://dx.doi.org/10.18462/iir.cryo.2019.0032>
62. Sarun Kumar Kochunni and **Kanchan Chowdhury**. LNG boil-off gas reliquefaction by Brayton refrigeration system – Part 1: Exergy analysis and design of the basic configuration, Energy (Elsevier) Volume 176, April 2019, Pages 753-764.
63. Sarun Kumar Kochunni, Jubil Joy and **Kanchan Chowdhury**. LNG boil-off gas reliquefaction by Brayton refrigeration system – Part 2: Improvements over basic configuration, Energy (Elsevier) Volume 176, April 2019, Pages 861-873.
64. Rohit Singla, **Kanchan Chowdhury**. Comparisons of thermodynamic and economic performances of cryogenic air separation plants designed for external and internal compression of oxygen. Applied Thermal Engineering (Elsevier), Volume 160, September 2019, 114025.

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65. Sarun Kumar Kochunni, **Kanchan Chowdhury**. Use of dual pressure Claude liquefaction cycles for complete and energy-efficient reliquefaction of boil-off gas in LNG carrier ships. *Energy (Elsevier)* Volume 198, March 2020, 117345.
66. Sarun Kumar Kochunni, **Kanchan Chowdhury**. Zero methane loss in reliquefaction of boil-off gas in liquefied natural gas carrier ships by using packed bed distillation in reverse Brayton system. *Journal of Cleaner Production (Elsevier)* Volume 260, March 2020, 121037.
67. Rohit Singla, **Kanchan Chowdhury**, Saving power by modifying a double column air separation plant to produce high and low purity pressurized gaseous oxygen simultaneously. *Energy (Elsevier)*, Volume 210, November 2020, 118487.
68. Jubil Joy and **Kanchan Chowdhury**. Optimizing distribution of heat exchanger surface areas for enhanced power output from vaporizing LNG at 6 bar in an organic Rankine cycle, *Thermal Science and Engineering Progress (Elsevier)*, Volume 21, November 2020, 100779.
69. Jubil Joy and **Kanchan Chowdhury**. Enhancing generation of green power from the cold of vaporizing LNG at 30 bar by optimising heat exchanger surface area in a multi-staged organic Rankine cycle, *Sustainable Energy Technologies and Assessments (Elsevier)*, Volume 43, December 2020, 100930.
70. Chirag Jadav and **Kanchan Chowdhury**. Minimizing weight of ambient air vaporizer by using identical and different number of fins along the length, *Renewable energy (Elsevier)*, Volume 163, January 2021, Pages 398-413. doi: <https://doi.org/10.1016/j.renene.2020.08.141>
71. Sarun Kumar Kochunni, **Kanchan Chowdhury**. Effect of precooling with transcritical CO₂ cycle on two types of LNG boil-off gas reliquefaction systems. *Journal of Natural Gas Science & Engineering (Elsevier)*, Volume 89, March 2021, 103876.
72. Rohit Singla, **Kanchan Chowdhury**. Enhanced oxygen recovery and energy efficiency in a reconfigured single column air separation unit producing pure and impure oxygen simultaneously. *Chemical Engineering and Processing - Process Intensification (Elsevier)*, Volume 162, May 2021, 108354.
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Industry Trainings (Continuing Education/Short term courses) Conducted and Taught:

Conducted and taught more than 70 courses and training programs from 1991 till date benefiting directly 1500 professional engineers of India and of West and South Asia, primarily in the field of

- **Refrigeration Technology,**
- **Cryogenic Air Separation**
- **Prevention of Fire in Oxygen-enriched Systems**
- **Causes and Prevention of Hospital Fires**

These courses were held at IIT Kharagpur campus and also as on-site courses for Industries in India and abroad. I held courses for Linde India Limited, Praxair Limited, Tata Steel, Bhilai Steel Plant, Rourkela Steel Plant, Bokaro Steel Plant, Centre for Engineering and Technology (SAIL), IISCO Steel Plant (SAIL), Odisha Health Services, Govt of Odisha, India, for Khartoum Refinery Company at Sudan, ORYX-GTL at Qatar and for Linde Bangladesh at Dhaka.

Captive plants in Integrated Steel Plants and Chemical industry, Merchant plants in Industrial Gas Industry and Cryogenic Research Establishments of India and abroad benefitted from these programs.

Extra-academic Interest:

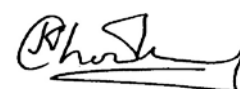
Spiritual understanding helps a person to shape his life's philosophy and attitude, no matter what his age is. Delivered the following invited lectures aimed at students and teachers:

- **Positive Thinking**, delivered at IIT Kharagpur at Institute Orientation Programme for Freshers on the 13th July, 2009.
- **Role of spirituality in academics**, delivered at Kolkata University, UGC Supported Orientation Programmes and Refresher Courses for Teachers, UGC-Academic Staff College (UGC-ASC) on the 4th September, 2014.
- **Spirituality: An algorithm for perfect life: Part 1: Why should we learn it?**
delivered at IIT Guwahati on the 15th October, 2014 and at BIT Mesra at Ranchi on the 17th January, 2015
- **Spirituality: An algorithm for perfect life: Part 2: How can we learn it?**
delivered at IIT Guwahati on the 16th October, 2014 and at BIT Mesra at Ranchi on the 17th January, 2015
- **Spirituality: An algorithm for perfect life: Why should and how can we learn it?**
delivered at IIT Bhubaneswar on the 7th January, 2017
- **Know your Self to get true success and lasting happiness**
delivered at IIT Bhubaneswar on the 10th November, 2017 and at Navodadaya Vidyalaya Samiti, Patna Region, Regional Level Science Congress – 2017 on the 18th November, 2017
- **Let us know the grammar of life**
delivered at IIT Bhubaneswar on the 21st October, 2019
- **Thinking differently: Maintaining positivity amidst all odds**
Delivered to the students of IIT Kharagpur under SAMYOG program on the 6th February, 2022
- **Spirituality in Academic Life:** Invited as Chief Guest National Science Day on 28th February 2022, C.V. Raman Global University, Bhubaneswar

I declare that the information provided in the curriculum vitae is true to the best of my knowledge and belief.

Date: June 10, 2022

Place: Kharagpur, West Bengal, India



Signature of the applicant