BIODATA of Abhiram Hens

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Area of Research

- Computational Fluid Dynamics (CFD) & Heat Transfer
- Molecular Dynamics Simulations
- AI based process modelling
- Microfluidics & Nanotechnology

Teaching subjects

- Advanced Fluid Dynamics
- Process Analysis and Optimization
- Process Safety in Chemical Industries
- CFD Applications in Chemical Engineering
- Computing Lab
- Fluid Mechanics Lab

Academic qualifications:

- **Ph.D.** (Engineering Science) CSIR-Central Mechanical Engineering Research Institute (under AcSIR), 2016
- **M.Tech** (Chemical Engineering) Indian Institute of Technology, Kanpur, 2010
- **B.Tech**. (Chemical Engineering) Calcutta University, 2008
- **B.Sc** (Hons in Chemistry) Calcutta University, 2005

Experience

Sl. No.	Position held (Designation)	Place of work	Duration	Areas of work
1	Assistant Professor	Department of Chemical Engineering, National Institute of Technology Durgapur, India	2019-till date	Teaching and Research
2	Senior Scientist	CSIR - Central Mechanical Engineering Research Institute, Durgapur, WB,India	2014-2018	R&D
3	Scientist	CSIR - Central Mechanical Engineering Research Institute, Durgapur, WB,India	2010-2014	R&D
4.	Assistant Professor	Academy of Scientific and Innovative Research (AcSIR)	2018	Research Guidance
5.	Teaching Assistant	IIT Kanpur	2009-2010	Academic activity

Research Contribution (Details given in Annexure)

- Number of SCI/Scopus Journal Publications: **38**
- Number of Conference Papers: **12**
- Number of Patents: 03 (one granted)
- Book Chapter: **01**
- Research Projects Completed: **09** (03 as PI and 06 as Co-PI)
- Ph.D Guidance: **04** (Two completed)
- M.Tech Guidance: **08** (six completed)
- Number of Citations based on Google Scholar: 1339 (h-index: 13) as on 1st Feb, 2025

Awards and Recognition

- CSIR Young Scientist Award – 2018
- Tharmax 'Sampark' Fellowship-2020
- Organizing Secretary, 36th National Convention of Chemical Engineers (IEI) and National Conference on "Frontier Technologies for 21st Century's Process Industries" (March 6-7, 2021)
- Session Chair of Technical Session "International Chemical Engineering Conference 2021 NITJ"
- Session Chair of Technical Session on Fluid Dynamic 16th International Conference on Chemical and Process Engineering (ICheaP 16), Naples, Italy 21-24th May 2023
- Visiting Researcher, Vilnius Gediminus Technical University (Vilnius Tech), Lithuania (May-June, 2025)

Annexure

List of SCI Journal Publications

1. Probir Biswas, Raj Agarwal, Braj Bhushan, Abhiram Hens*, Gautam Biswas*, “Interfacial hydrodynamics of electrosprays using leaky dielectric fluids", **Physics of Fluids**, Vol. 37, pp.22150 (2025)

2. Indradev Kumar, Sandip Kumar Lahiri, Abhiram Hens*, Gautam Biswas*, “Influence of surface morphology and temperature on nanoscale boiling of liquid nitrogen on a platinum substrate”, **International Journal of Thermal Sciences**, Vol. 210, pp. 109655 (2025)

3. Indradev Kumar, Sandip Kumar Lahiri, Abhiram Hens*, “Heat transfer analysis of liquid nitrogen film boiling in the presence of reduced gravity and electric field”, **Numerical Heat Transfer, Part A: Applications**, https://doi.org/10.1080/10407782.2025.2541811 (2025)

4. Pratyush Kumar Pal, Abhiram Hens, Narottam Behera, Sandip Kumar Lahir, “Digital twins: Transforming the chemical process industry—A review”, **Canadian Journal of Chemical Engineering**, Vol. 103 (3611) (2025)

5. Debanik Bose , Kartik C. Ghanta and Abhiram Hens, “CFD-based investigation of NO x removal from industrial waste gas by selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR) process using NH3”, **International Journal of Chemical Reactor Engineering,** https://doi.org/10.1515/ijcre-2024-0033 (2024)

6. Debanik Bose, Aritra Bangal, Abhiram Hens, Sanjib Barma, “Design and optimization of reactive distillation for enhancing supercritical transesterification process to produce biodiesel”, **Chemical Engineering and Processing - Process Intensification**, Vol. 203, pp. 109877 (2024)

7. Debanik Bose, Indradev Kumar, Abhiram Hens, “Enhancing fuel-air mixing in COG-BOG non-premixed combustion: A CFD analysis with different turbulent models”, **Journal of the Indian Chemical Society**, Vol. 101, pp. 101222 (2024)

8. Rajneesh Anand, Mrinal Kanti Mandal, Rajib Ghosh Chaudhuri, Abhiram Hens, “Effect of patterned condensation surface on the performance of a newly designed basin-type solar desalination unit”, **Applied Thermal Engineering**, Vol. 249, pp. 123399 (2024)

9. Indradev Kumar, Anindya Kanti Roy, Abhiram Hens*, “Effect of pressure variations on film boiling characteristics of liquid nitrogen”, **Physics of Fluids,** Vol. 35, pp. 101102 (2023)
10. Indradev Kumar, **Abhiram Hens***, “A Continuum and Molecular Dynamics-based Simulation Study of Boiling in Liquid Nitrogen”, **Chemical Engineering Transactions**, Vol. 100, pp. 343-348 (2023)
11. Nagendra Kumar Jilagam, Arnab Sau, Sanjay Varma Addepalli, **Abhiram Hens**, Susmita Dutta, “Mitigation of oil spills from synthetic seawater using human hair – Experimentation, modeling and optimization”, **Chemometrics and Intelligent Laboratory Systems**, Vol.242 (2023)
12. Debanik Bose, Indradev Kumar**, Abhiram Hens***, Performance analysis of methanol steam micro-reformers for enhanced hydrogen production using CFD, **Chemical Engineering Research and Design,**Vol. 196, 297-308 (2023)
13. Rajneesh Anand, Mrinal Kanti Mandal, Rajib Ghosh Chaudhuri, **Abhiram Hens*,** "Optimisation of geometry and surface wettability for enhanced efficiency of the solar still-based desalination unit", **International Journal of Ambient Energy,** Vol. 44(1),1549-1556, 2023
14. Indradev Kumar**, Abhiram Hens***, Sandip K Lahiri, Gautam Biswas*, "Study of Cryogenic Film Boiling in the Presence of External Electric Field Using a Variant of Volume of Fluid-Based Interface Tracking Algorithm", **Industrial Engineering and Chemistry Research**, Vol. 61, 49, 18176-18186 (2022)
15. S. Chatterjee, I. Kumar, K. C. Ghanta, **A. Hens*,** G. Biswas*, “Insight into molecular rearrangement of a sessile ionic nanodroplet with applied electric field”, **Chemical Engineering Science**, Vol. 247, page. 117083 (2022)
16. S.Gun, S. Chatterjee, **A. Hens***, "CFD based analysis of chlorination contact tank design", Materials Today: Proceedings,(2022)
17. S. Chatterjee, **A. Hens*,** K. C. Ghanta, G. Biswas*, “Molecular dynamics study of sessile ionic nanodroplet under external electric field”, **Chemical Engineering Science**, Vol. 229, page. 116143 (2021)
18. S. Chatterjee, K. C. Ghanta*, **A. Hens*,** “Study of multiphase flow inside straight and spiral microchannel and effect of two phase flow on Dean’s vortices”, **Chemical Engineering Research and Design**, Vol. 165, page. 398 (2021)
19. S. Chatterjee, K. C. Ghanta, **A. Hens*,** G. Biswas*, Dynamics of Taylor bubbles in non-Newtonian shear thinning continuous phase**, Progress in Computational Fluid Dynamics** (Accepted)
20. S.K.Lahiri, S. K. Chowdhury, **A. Hens**, K. C. Ghanta, “Modeling and multi-objective optimization of commercial ethylene oxide reactor to strike a delicate balance between profit and negative environmental impact”, **Environmental Science and Pollution Research**, doi.org/10.1007/s11356-021-12504-w (2021)
21. S. Pal, S. Chowdhury, A Hens, S K Lahiri, "Artificial intelligence based modelling and multi-objective optimization of vinyl chloride monomer (VCM) plant to strike a balance between profit, energy utilization and environmental degradation", **Journal of the Indian Chemical Society** (2021)
22. S. Chowdhury, S. K. Lahiri, **A. Hens**, S. Katiyar, “Performance enhancement of commercial ethylene oxide reactor by artificial intelligence approach”, **International Journal of Chemical Reactor Engineering** pp. 000010151520200230. https://doi.org/10.1515/ijcre-2020-0230 (2021)
23. M. Chatterjee, N. Jaiswal, **A. Hens**, N. Mahata, N.Chanda*, Development of 6-Thioguanine conjugated PLGA nanoparticles through thioester bond formation: Benefits of electrospray mediated drug encapsulation and sustained release in cancer therapeutic

applications, **Materials Science and Engineering: C,** Vol. 114, page: 111029 (2020)

24. P. Mitra, S. Dutta, **A.Hens*,** "Separation of particles in spiral micro-channel using Dean's flow fractionation", **Journal of Brazilian Society of Mechanical Sciences and Engineering**, 534, 122-130 (2020)
25. N. Kumar, K. C Ghanta, **A. Hens***, CFD based investigation of 'Microfluidic thermophoresis', **J. Indian Chem. Soc**, 97, 857-863 (2020)
26. N. Jaiswal, **A. Hens***, M. Chatterjee, Nibedita Mahata, N.Chanda*, EDA assisted functionalization of self-organized PLGA patterned surface to enhance cancer cell isolation, **Journal of Colloid and Interface Science,** 534, 122-130 (2019)
27. M. Chatterjee, , **A. Hens***, K. Mahato, N. Jaiswal, N. Mahato, Nagahaumaiah, N. Chanda*, " A novel approach to fabricate PLGA micro-particles with encapsulated dye molecules by thin film dewetting technique" , **Journal of Colloid and Interface Science**, 506, 126-134 (2017)
28. S.K. Saha, **A Hens**, N.C. Murmu, P. Banerjee, "A comparative density functional theory and molecular dynamics simulation studies of the corrosion inhibitory action of two novel N-heterocyclic organic compounds along with a few others over steel surface"**, Journal of Molecular Liquids,** 215, 486-495 (2016)
29. **A. Hens**, K. Mondal, G. Biswas, D. Bandyopadhyay " Pathways from disordered to ordered nanostructures from defect guided dewetting of ultrathin bilayers", **Journal of Colloid and Interface Science**, 465, 128-139 (2016)
30. **A. Hens**, G. Biswas, S. De, "Evaporation of water droplet on Pt-surface in presence of external electric field - A molecular dynamics study", **Journal of Chemical Physics**, 143, 094702 (2015)
31. A. Kumar, **A. Hens**, R. K. Arun, M. Chatterjee, K. Mahato, K. Layek, N. Chanda, " A paper based microfluidic device for easy detection of uric acid using positively charged gold nanoparticles", **Analyst**, 140, 1817-1821 (2015)
32. T. Chakraborty, **A. Hens***, S. Kulashrestha, N. C. Murmu, P. Banerjee*, " Calculation of diffusion coefficient of long chain molecules using molecular dynamics " **Physica E**, 69, 371-377 (2015)
33. S. K. Saha, P. Ghosh, **A. Hens**,N. C. Murmu, P. Banerjee, " Density functional theory and molecular dynamics simulation study on corrosion inhibition performance of mild steel by mercapto-quinoline Schiff base corrosion inhibitor " **Physica E**, 66, 332-341 (2015)
34. **A. Hens**, G. Biswas, S. De, "Analysis of interfacial instability and multimode bubble formation in saturated boiling using coupled level set and volume-of-fluid approach", **Physics of Fluids**, 26, 012105 (2014)
35. **A. Hens**, R. Agarwal, G. Biswas, "Nano-scale study of boiling and evaporation in liquid Ar film on a Pt -heater using molecular dynamics simulation", **International Journal of Heat and Mass Transfer**, 71, 303 (2014)
36. S. K. Saha, **A. Hens**, N. C. Murmu, P. Banerjee, " Molecular dynamics and density functional theory study on corrosion inhibitory action of three substituted pyrazine derivatives on steel surface", **Canadian Chemical Transactions**, 2(4), 489 (2014)
37. **A. Hens**, K. Mondal, G. Biswas, D. Bandyopadhyay, "Self-organized pathways to nanopatterns exploiting the instabilities of ultrathin confined bilayers", **Physical Review E**, 87, 022405 (2013)
38. T. K. Patra, A. Hens, J. K. Singh, "Vapor liquid phase coexistence and transport properties of two-dimensional oligomers", **Journal of Chemical Physics**, 137, 084701 (2012)
39. A. K. Metya, **A. Hens**, J. K. Singh, " Molecular dynamics study of vapor-liquid phase equilibria and transport properties of sodium and lithium-based on EAM potential", **Fluid Phase Equilibria,** 313, 16 24 (2012)

Conference papers:

1. N. Jaiswala, A. Hens, Nagahanumaiah, N. Mahatab, N. Chanda A micropatterned polystyrene surface for Protein immobilization, International Conference on Sustainable Manufacturing, Automation and Robotics Technologies (IC-SMART 2017), Durgapur, December 17
2. M. Chatterjee, A. Hens, N Mahata, N Chanda, A Simple Technique for the Synthesis of Dye Encapsulated Polymeric Nanoparticles, International Conference on Advancements in Polymeric Materials, Bhubaneswar, February 2018
3. P Mitra, S Dutta, A Hens, Nagahanumaiah, Identification of diseased cells using image processing, National Conference on Advanced Materials, Manufacturing and Metrology (NCAMMM-2018), Durgapur, January 2018
4. T. K. Patra, A. Hens and J. K. Singh, Structure, dynamics and phase equilibria of 2D polymeric fluids (Poster), TCS10 (Theoretical Chemistry Symposium 2010). IIT Kanpur, Kanpur, India, December 8-12, (2010).
5. N Chanda, R.K Arun, H Shah, A Hens, S Mandal and Nagahanumaiah, "Nanosystems for advancement of research in environment and biomedical science", Bangalore Nano 2012, Bangaluru, India (2012)
6. B. Kamila and A. Hens, 2-D Modeling of microfludic biomolecule capturing device, Chemcon 2015, IIT Guwahati, Guwahati, India (2015)
7. S. Chatterjee, M. Gorain, A Hens, K. C. Ghanta," Numerical simulation on shear thinning slug flow – the effect of non-Newtonian viscosity on the dynamics of Taylor bubble", CHEMCON-2019, IIT Delhi(2019)
8. Sudeshna Gun, Shilpi Chatterjee, Abhiram Hens, "CFD Based Analysis of Chlorination Contact Tank Design", International Chemical Engineering Conference 2021, NIT Jalandhar(India) , 16-20 September, (2021)
9. Debanik Bose, Indradev Kumar, Abhiram Hens, Enhanced hydrogen production from methanol steam reforming with spiral and serpentine channel reactor, International Chemical Engineering Conference 2022, Organized by Department of Chemical and Biochemical Engineering, IIT Patna in Association with IIChE Patna Regional Centre, November 12-13, 2022
10. Debanik Bose, Indradev Kumar, and Abhiram Hens, A case study on CFD-based analysis of the HVAC system of a classroom, International Conference on Chemical Engineering Innovation & Sustainability (ICEIS 2023) Jadavpur University, 2023
11. Indradev Kumar, Abhiram Hens, A Continuum and Molecular Dynamics-based Simulation Study of Boiling in Liquid Nitrogen, 16th International Conference on Chemical and Process Engineering (ICheaP 16), Naples, Italy 21-24th May 2023
12. Indradev kumar, Anindya kanti roy, Abhiram Hens, Effect of pressure variations on film boiling characteristics of liquid nitrogen using CLSVOF-based numerical simulations, International Conference on Recent Advances in Fluid Mechanics and Nanoelectronics(ICRAFMN-2023), Bangalore, India 12-14 July 2024
13. Prince Kumar, Jayabrata Dhar, Biswajit Kamila, Abhiram Hens, "CFD based analysis of blood flow inside a clogged artery" IIChE-CHEMCON 2024 December 27-30, 2024
14. Braj Bhushan, Probir Biswas, K C Ghanta, Gautam Biswas, Abhiram Hens, "Numerical analysis of electro-spray with leaky dielectric fluid", 4th Energy System Modeling and Optimization Conference December 9-11, 2024, NIT Durgapur, India
15. Anshu Kumari, Abhiram Hens, Susmita Dutta, "Phycoremediation of dairy industry whey water using selected microalgal strain: growth kinetics and organic load reduction" International Conference on Advances in Medical Biotechnology · ICAMB 2025 · January 20 - 22, 2025, HIT Kolkata

Patents

1. "A method to fabricate polymeric micro/nano particles encapsulated with external species" N. Chanda, A. Hens, Nagahanumaiah, K Mahato, A Kumar (Ref. No. 4217/DEL/2015) (Granted in 2020)
2. "Mini-microscope for cell visualization" , A. Hens, N. Chanda. Nagahanumaiah V. Sharma, P. Mitra,S. Haldar, K. Chatterjee, (Ref. No. 201711043099)

Books Published/Chapters contributed

Book Chapter:

Name of the Book : Environmental, Chemical and Medical Sensors
Name of the chapter: Polymeric-Patterned Surface for Biomedical Applications (Chapter 10, Author: A. Hens et. al)
Name of the Editor: S. Bhattacharya et. al.
Publisher: Springer (Singapore 2018)

List of projects completed/on-going

Title	Sponsoring Agency	Period	Achievements
Title: Adhesion, Dewetting and contact line studies of micro/nano fluids employing a molecular simulation and CFD approach	CSIR - CMERI Instt. *Project No. OLP-190712,*	March, 2011 - March, 2014	**Role**: Project Leader **Status**: Successfully Completed with a number of good quality journal publications (e.g. Physical Review E, Journal of Chemial Physics, Int. J. of Heat and Mass transfer etc)
Title: Integrated lab-on-chip for circular tumor cell (CTC) isolation and diagnosis	Apart of CSIR 12-FYP mega project, *Project No.* ESC 0112/RP- II/ T4.1	Sept' 2013 - March' 2017	**Role**: Project Leader **Status**: Completed successfully with a number of good publications and patents
Title: Preliminary Investigation on Dip Pen Nanolithography	CSIR - CMERI Instt. *Project No. OLP- 182412*	March' 2012 - March' 2014	**Role**: Co - PI **Status**: Completed successfully with a number of publications
Title: Nano Patterning of metallic and polymeric thin films	Part of CSIR 12-FYP mega project, *Project No.* ESC 0112/RP- II/ T1.4,	Sept' 2013 - March' 2017	**Role**: Co-PI **Status**: Completed successfully with publications and patents
Title: Micro Fuel Cell	CSIR - CMERI Institute project	May' 2016 - May' 2018	**Role**: Co-PI **Status**: Completed successfully with the demonstration of prototype
Title: Solar Converted Thermal Energy Harvesting Mangrove and Composite Layer Mechanistic Photo-thermal Material in Interfacial Water Evaporator-Collector Desalination System to Potable Water	Dept. of Science & Technology (GOI)	2021-2024	**Role**: Co-PI **Status**: On going
Title: Modelling and simulation of nanoparticle mediated drug delivery systems	NIT Durgapur	2019-2021	**Role**: Co – PI **Status**: Completed successfully with a number of publications (*Chemical Engg Science etc*.)
Title: Scientific and technological aspect of Electromagnetic field for reducing scaling in RO based water treatment system	Eureka Forbes	2022	**Role-Co-PI**
Title: Modelling and Optimization of Ethylene Oxide Reactor	Scientific Design Company, Inc USA	2021-21	Role **Co-PI** Status: Completed
Title: Understanding the industrial reactor code for necessary upgradation and future application	Scientific Design Company, Inc USA	29.9.2023-10.12.2024	Role : **PI** Status: Completed