

Curriculum Vitae



Dr. Chiranjit Ghosh, Ph.D.

Postdoctoral Research Fellow

Division of Infectious Disease

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Topic Editor of 'Separations'

MDPI publishing Group

DOB: Jan 10, 1988

Country of Residence: USA

Harvard catalyst profile: <https://connects.catalyst.harvard.edu/Profiles/display/Person/187748>

Personal webpage: www.chiranjitghosh.com

Academic Journey:

Degree / Designation	University	Year of passing	Department
Bachelor of Science	University of Calcutta, India	2009	Dept. of Chemistry
Master of Science	West Bengal State University, India	2011	-Do-
Junior Research Fellow	Jadavpur University, India	2011-2012	-Do-
Ph.D. Researcher	S. N. Bose National Centre for Basic Sciences, India	2012-2017	Dept. of Chemical, Biological & Macro-Molecular Sciences
Postdoctoral Research Fellow	University of Waterloo, Canada	2018- February, 2020	Analytical Chemistry
Postdoctoral Research Fellow	Harvard Medical School, Harvard University, USA	February 2020-Present	Infectious disease division

Ph.D. Thesis and Supervisor:

Supervisor: **Dr. Manik Pradhan, Ph.D.** (University of Bristol, UK), Post-doc (Stanford, USA & Cambridge, UK)

Associate Professor, Satyendra Nath Bose National Centre for Basic Sciences

JD Block, Sector III, Salt Lake, Kolkata-700106, India

Research at University of Waterloo, Canada

During my first postdoc in Pawliszyn's group, my research works mainly focused on the development of breath analysis methods exploiting solid phase micro-extraction (SPME) and needle trap (NT) technology for real-time analysis of volatile organic compounds (VOCs) in breath for evaluation of human health and a variety of disease states

Research at Harvard, USA:

I am working on the animal model to identify novel volatile biomarkers of specific fungal and bacterial infections and examine the dynamics of these metabolites with antibiotic or antifungal therapy

Academic Achievement:

- Qualified Graduate Aptitude Test in Engineering (**GATE**), **2013**
- Received "**University Grant Commission-Basic Scientific Research Fellowship in Science and for Meritorious Students**" **2011-2012**
- Qualified in all India based "**BOSE TEST**", **2012** examination for pursuing PhD programme organized by S. N. Bose National Centre for Basic Sciences under the Department of Science and Technology, Govt. of India.
- Selected for PhD programme in S. N. Bose National Centre for Basic Sciences, 2012
- Selected for PhD programme in Department of Chemistry, Jadavpur University, 2011

Experience:

- Guest Lecturer in Physical Chemistry (2011-2012): Asutosh College, University of Calcutta
- Potential reviewer for scientific journals like *Analytica Chimica Acta* (Elsevier), *Sensors* (MDPI), *Metabolites* (MDPI), *Journal of Breath Research* (IOP) etc.

Honorary Position:

Topic Editor (2020-present)

'*Separations*' international scientific journal,
MDPI publishing group, Basel, Switzerland

Research Interests:

- To identify novel volatile biomarkers of specific fungal and bacterial infections and examine the dynamics of these metabolites with antibiotic or antifungal therapy
- Monitoring of volatile organic compounds associated with human diseases
- Develop device and protocol for noninvasive detection of diseases from exhaled breath
- Sample preparation techniques including Solid-phase Microextraction (SPME), Needle Trap Technology (NTD) in analytical chemistry
- Applications of SPME and NTD for detection of estimations of volatile organic compounds in environment and human breath
- Non-invasive isotope-specific molecular diagnosis of biomedical diseases
- Applications of metallocomplex in bio-medical disease therapy

Major Contributions in Modern Research

- In my thesis work, I have taken a leading role to develop a **simple and cost-effective residual gas analyzer-based mass spectrometry** (RGA-MS) technique for accurate *non-invasive* assessment of pre-diabetes and type 2 diabetes using exhaled breath analysis. This tool may serve as an alternative non-invasive **point-of-care diagnostic method** for

routine clinical practices as well as for large-scale diabetes screening purposes in a country like India.

- We have shown experimentally for the first time that ^{18}O -isotope of breath CO_2 ($^{12}\text{C}^{18}\text{O}^{16}\text{O}$ isotope) is a **potential biomarker** for *non-invasive diagnosis* of pre-diabetes, type 2 and type 1 diabetes.
- We have demonstrated that the measurements of erythrocytes carbonic anhydrase (CA) activity may be a potential candidate to distinguish precisely pre-diabetes prior to the onset of type 2 diabetes
- We have also taken a step towards unraveling the potential **metabolic pathways** underlying the fundamental mechanisms responsible for the alteration of erythrocytes CA activity and ^{18}O -isotopic change in breath
- We have also shown for the first time that carbon-13 stable isotope of breath CO_2 correlates with insulin sensitivity index ($\text{ISI}_{0,120}$). We have also determined the **diagnostic cut-off values** of carbon-13 isotope and ISI with high sensitivity and specificity for the **practical diagnosis** of pre-diabetes and type 2 diabetes.

Research Awards & Honors:

SL. No.	Award/Prize Name	Conference/Organizer	Year	Place
1.	Young Investigator Award	European Society for Endocrinology	2019	Lyon, France
1.	Best Oral Paper Presentation	International Diabetes Summit-2017	2017	Pune, India
2.	Best Paper Award	National Annual Conference of Hypertension Society of India	2017	Kolkata, India
3.	SIGMA-ALDRICH Excellent Poster Award	International Conference of the Korean Society for Molecular and Cellular Biology	2016	South Korea
4.	IFCC-TFYS Young Scientists Award	International Federation of Clinical Chemistry	2016	Mangalore, India
5.	Student Travel Award	14 th Asia Specific Federation for Clinical Biochemistry and	2016	Taiwan

		Laboratory Medicine Congress		
6.	DR. C. SITA DEVI AWARD	Association of Clinical Biochemists of India	2015	Chandigarh, India
7.	2nd Best Prize for Oral Presentation	9 th Annual Conference of RSSDI Maharashtra Chapter	2015	Pune, India
8.	One of the Best Six Research Papers Award	4 th Annual Conference of the Integrated Diabetes & Endocrine Academy (IDEACON),	2015	Kolkata, India
9.	Best Innovation Research Idea Award	Research Society for the Study of Diabetes in India	2014	Bangalore, India
10.	One of the Best Poster Prize	41 st Annual Conference of the Association of Clinical Biochemists of India	2014	Jodhpur AIIMS, India
11.	Best Poster Presentation	Satyendra Nath Bose National Centre for Basic Sciences	2013	Kolkata, India

Travel Grants and Awards:

- **Young Scientist Travel Grant** (Letter No. ITS/3239/ 2015-2016) from Department of Science & Technology, Govt. of India for presenting my research work in International Conference (**IABR SUMMIT 2015, Austria**)
- **Young Scientist International Travel Grant Award** from Korean Society for Molecular and Cellular Biology, **South Korea** (ICKSMCB-2016)
- **International Student Travel Award** by 14th Asia-Pacific Federation for Clinical Chemistry and Laboratory Medicine Congress, **Taiwan**
- **International Travel Grant** by The 5th Seoul International Congress of Endocrinology and Metabolism 2017, **South Korea** (**SICEM 2017**)
- **International Travel Grant** by Korean Diabetes Association, **South Korea, 2017** (**ICDM-2017**)

Patent Filed and Published:

SL. No.	Title of the invention	File No. & Date of Publication	Inventors	Country
1	Mixed use binder for solid phase microextraction coatings	Provisional patent filed Application No. 63078206	1. Chiranjit Ghosh 2. Varoon Singh 3. Jonathan Grandy 4. Janusz Pawliszyn	USA (2020)
1	“System and kit for monitoring blood glucose profile based on breath analysis”	File No. 201631003758 Published on: 04/03/2016	1. Chiranjit Ghosh 2. Manik Pradhan	India (2016)
2	“Dioxo vanadium (V) complex as carbonic anhydrase inhibitor”	Granted on 9/11/2020 Patent No. 338829	1. Chiranjit Ghosh 2. Manik Pradhan 3. Debashis Patra 4. Tapas Ghosh	India (2016)
3	“A System for monitoring hemodialysis efficacy of a subject”	File No. 201731042502 Published on: 08/12/2016	1. Chiranjit Ghosh 2. Santanu Mandal 3. Manik Pradhan	India (2017)

Peer-Reviewed Journal Publications:

No.	Title	Authors	Journals (Vol/Page/Yr)	Publishers
1.	<i>Development and validation of a headspace needle-trap method for rapid quantitative estimation of butylated hydroxytoluene from cosmetics by hand-portable GC-MS</i>	C. Ghosh <i>et. al</i>	RSC Advances (2020)	Royal Society of Chemistry

2.	“Recent advances in breath analysis to track human health by new enrichment technologies”	C. Ghosh et al.	Journal of Separation Sciences (2019)	John Wiley & Sons, Ltd
3.	“Isotopic evidences of the preferential coordination between $^{12}\text{CO}_2$ and urease enzyme”	S. Maithani, A. Maity, M. Pal, S. Bhattacharya, G Banik, C. Ghosh et al.	Chemical Physics 520, 21 (2019)	North-Holland
4.	“Isotope-specific breath analysis to track the end-stage renal disease during hemodialysis”	S. Mandal, P. Mukhopadhyay, C. Ghosh et al.	Journal of Breath Research 12,036019 (2018)	Institute of Physics (IOP)
5.	“A new strategy for in-vitro determination of carbonic anhydrase activity from analysis of oxygen-18 isotopes of CO_2 ”	C. Ghosh et al.	Analytical Chemistry 90(2):1384-1387 (2018)	Americal Chemical Society (ACS)
6.	“ ^{13}C -isotope abundance in natural nutrients: a new formulated test meal for non-invasive diagnosis of type 2 diabetes”	C. Ghosh et al.	Journal of Breath Research 11, 026005 (2017)	Institute of Physics (IOP)
7.	“Targeting erythrocyte carbonic anhydrase and ^{18}O -isotope of breath CO_2 for sorting out type 1 and type 2 diabetes”	C. Ghosh et al.	Scientific Reports, 6, 35836 (2016)	Nature Publishing Groups (NPG)
8.	“Insulin sensitivity index ($\text{ISI}_{0, 120}$) potentially linked to carbon isotopes of breath CO_2 for pre-diabetes and type 2 diabetes”	C. Ghosh et al.	Scientific Reports, 5, 11959 (2015)	Nature Publishing Groups (NPG)
9.	“Oxygen-18 isotope of breath CO_2 linking to erythrocytes carbonic anhydrase activity: a biomarker for pre-diabetes and type 2 diabetes”	C. Ghosh et al.	Scientific Reports, 5, 8137 (2015)	Nature Publishing Groups (NPG)
10.	“Non-invasive ^{13}C -glucose breath test using residual gas analyzer-mass spectrometry: a novel tool for screening individuals with pre-	C. Ghosh et al.	Journal of Breath Research, 8, 036001 (2014)	Institute of Physics (IOP)

	<i>diabetes and type 2 diabetes</i>			
11.	<i>“Mechanisms linking metabolism of Helicobacter pylori to ¹⁸O and ¹³C-isotopes of human breath CO₂”</i>	S. Som , A. De, G. Banik , A. Maity , C. Ghosh et al.	Scientific Reports, 5, 10936 (2015)	Nature Publishing Groups (NPG)
12.	<i>“Oxygen-18 stable isotope of exhaled breath CO₂ as a non-invasive marker of Helicobacter pylori infection”</i>	A. Maity, S. Som, C. Ghosh et al.	Journal of Analytical Atomic Spectrometry, 29, 2251 (2014)	Royal Society of Chemistry (RSC)
13.	<i>“Halloysite nanotubes capturing isotope selective atmospheric CO₂”</i>	S. Jana, S. Das, C. Ghosh et al.	Scientific Reports, 5, 8711 (2014)	Nature Publishing Groups (NPG)
14.	<i>“Residual gas analyzer-mass spectrometry for human breath analysis: a new tool for the non-invasive diagnosis of Helicobacter pylori infection”</i>	A. Maity, G. Banik, C. Ghosh et al	Journal of Breath Research, 8, 016005 (2014)	Institute of Physics (IOP)
15.	<i>“Excretion kinetics of ¹³C-urea breath test: influences of endogenous CO₂ production and dose recovery on the diagnostic accuracy of Helicobacter pylori infection”</i>	S. Som, A. Maity, G. Banik, C. Ghosh et al.	Analytical and Bioanalytical Chemistry, 406:5405–5412 (2014)	Springer
16.	<i>“Diagnosis of small intestinal bacterial overgrowth in irritable bowel syndrome patients using high-precision stable ¹³CO₂/¹²CO₂ isotope ratios in exhaled breath”</i>	G. Banik, A. Maity, S.Som, C. Ghosh et al.	Journal of Analytical Atomic Spectrometry, 29, 1918 (2014)	Royal Society of Chemistry (RSC)
17.	<i>“Moisture induced isotopic carbon dioxide trapping from ambient air”</i>	S. Das, C. Ghosh et al.	Journal of Materials Chemistry A, 4 (20), 7632-7640 (2015)	Royal Society of Chemistry (RSC)

Scientific Meetings Presented:

1. **“Oral Paper Presentation”** in The 5th Seoul International Congress of Endocrinology and Metabolism 2017, South Korea.
2. **“Oral Paper Presentation”** in International Diabetes Summit-2017, Pune India, 2017
3. **“Poster Paper Presentation”** in The 5th Seoul International Congress of Endocrinology and Metabolism 2017, Seoul, South Korea , 2017
4. **“Oral Paper Presentation”** in National Annual Conference of Hypertension Society of India, Kolkata, India, 2017
5. **“Poster Paper Presentation”** in 7th World Congress of Diabetes-DiabetesIndia 2017, New Delhi, 2017
6. **“Oral Paper Presentation”** in 14th Asia Specific Federation for Clinical Biochemistry and Laboratory Medicine Congress, Taipei, Taiwan, 2016
7. **“Poster Paper Presentation”** in International Conference of the Korean Society for Molecular and Cellular Biology, Seoul, South Korea, 2016
8. **“IFCC-TFYS Young Scientists Award”** paper presentation (oral) in Association of Clinical Biochemists of India, Mangalore, India, 2016
9. **“Poster Paper Presentation”** in 44th Annual Conference of Research Society for the Study of Diabetes in India” , Lucknow, India, 2016
10. **“Oral Paper Presentation”** in 71st Annual Conference of the Association of Physicians of India”, Hyderabad, 2016
11. **“Oral Paper Presentation”** in S. N. Bose National Centre Bose Fest, Kolkata, India, 2016
12. **“Oral Paper Presentation”** in annual conference of Vivekananda Institute of Medical Sciences, Kolkata, India, 2016
13. **“Poster Paper Presentation”** in Optics Within Life Sciences Conference, TIFR Mumbai, India, 2016
14. **“SITA DEVI AWARD” Presentation (oral)** in the 42nd annual conference of Association of Clinical Biochemists of India, Chandigarh, India (2015)
15. **“Poster Paper Presentation”** in International Association of Breath Research Summit-2015, Vienna, Austria (2015)
16. **“Short Paper Award Session” presentation (oral)** in 4th annual conference of Integrated Diabetes & Endocrine Academy, Kolkata, India (2015)
17. **“Poster Paper Presentation”** in 6th World Congress of Diabetes-DiabetesIndia 2015, Chennai (2015)

18. **“Oral Paper Presentation”** in 9th Annual Conference of RSSDI Maharashtra Chapter, Pune, India (2015)
19. **“Poster Paper Presentation”** in Recent Trends and Perspective in Chemistry-2015 conference, Sikkim, India (2015)
20. **“Oral Paper Presentation” (Free paper)** of **“New Idea” session** in 29th Annual Scientific Conference, VIMS, Kolkata (2015)
21. **“Poster Paper Presentation”** in the 41st annual conference of Association of Clinical Biochemists of India, Jodhpur AIIMS, India (2014)
22. **“Poster Paper Presentation”** in 44th Annual Conference of Research Society for the Study of Diabetes in India”, Lucknow, India (2016)
23. **“Innovation Award Category”** research ideas presentation (**oral**) in 42nd Annual Conclave of Research Society for the Study of Diabetes in India, Bangalore (2014)
24. **“Poster Paper Presentation”** in S. N. National Centre for Basic Sciences Bose Fest , Lucknow, India (2016)
25. **“Oral Paper Presentation”** in 3rd Annual Conference of the Integrated Diabetes & Endocrine Academy (IDEACON), Kolkata (2014).