Dr. Subhankar Singha

Assistant Professor
Centre of Health Science and Technology
JIS Institute of Advanced Studies & Research (JIASR), Kolkata

Biography

Dr. Subhankar Singha completed his B.Sc. in 2005 from Midnapore College, and M.Sc. in 2007 from Indian Institute of Technology (IIT) Kharagpur. After spending a year as a Research Chemist in Ranbaxy Laboratories Limited at Gurgaon, he moved to South Korea where he received his PhD degree in Bioorganic Chemistry from Pohang University of Science and Technology (POSTECH) in 2013 under the supervision of Prof. Kyo Han Ahn on the topic of "Studies on donor–acceptor type fluorophores and two-photon probes for bioimaging application". From 2013, he started working as a postdoctoral researcher at POSTECH. In 2015, he was appointed as a Research Assistant Professor in the Department of Chemistry at POSTECH where he continued his independent research till 2019, prior to join JIS Institute of Advanced Studies & Research (JIASR) Kolkata.

His major research is focused on the development of novel biomaterials and probes/sensors/assay kits for bio-sensing and patho-biological analysis through fluorescence microscopic imaging. Currently, with a career vision of addressing health related social issues, he is interested in advanced research with interdisciplinary aspects focusing on– 1) drug delivery and theranostics, 2) anti-aging treatment/therapy, 3) point of care diagnostics, and 4) super-resolution imaging of protein-drug interaction in monitoring disease.

He has published several high impact research articles in peer reviewed international journals in the fields of biomaterials, analytical and bioorganic chemistry. He also co-authored three international and five domestic patent applications, among those a technology related to the development of fluorescent probes for hydrogen sulfide has also been transferred for commercialization through Merck Inc. USA.

Academic Qualifications

2013 **Ph.D.**
Chemistry, Dept. of Chemistry, Pohang University of Science and Technology (POSTECH), South Korea (*Thesis: Studies on donor-acceptor type fluorophores and two-photon probes for bioimaging application; Supervisor: Prof. Kyo Han Ahn*)

2007 **M.Sc.**
Chemistry, Dept. of Chemistry, Indian Institute of Technology Kharagpur (IIT KGP), India

2005 **B.Sc.**
Chemistry (*Honours*), Midnapore College, Vidyasagar University, West Bengal, India

2001 **Higher Secondary (10+2)**
West Bengal Council of Higher Secondary Education, Vidyasagar Vidyapith, West Bengal, India

1999 **Secondary (10^{th})**
West Bengal Board of Secondary Education, Keshpur L. N. High School, West Bengal, India

Professional Research Experiences

2015 - Present **Research Assistant Professor**
Dept. of Chemistry and School of Molecular Science (BK21PLUS)
Pohang University of Science and Technology (POSTECH), South Korea

2013 - 2015 **Post-Doctoral Research Assistant (Post Doc)**
Dept. of Chemistry and Center for Electro-Photo Behaviors in Advanced Molecular Systems
Pohang University of Science and Technology (POSTECH), South Korea

2007- 2008 **Chemist**
Technology Improvement Group, Research & Development Centre
Ranbaxy Laboratories Limited, Gurgaon, India

List of Journal Publications (International)

Google scholar link: https://scholar.google.com/citations?user=JCu8I4AAAAAJ&hl=en

2019

1) S. W. Cho, A. S. Rao, S. Bhunia, Y. J. Reo, **S. Singha*** (*corresponding author), K. H. Ahn*, Ratiometric fluorescence detection of Cu(II) with a keto-dipicolylamine ligand: a mechanistic implication, ***Sensors And Actuators B-Chemical***, 2019, 279, 204-212 (I.F. = **5.667**).
2) P. Singh, V. K. Sharma, **S. Singha**, V. G. Sakai, R. Mukhopadhyay, R. Das, S. K. Pal, Unraveling the role of monoolein in fluidity and dynamical response of a mixed cationic lipid bilayer, ***Langmuir***, 2019, 35, 4682–4692 (I.F. = 3.789).

2018

3) T. Umme, **S. Singha*** (*corresponding author), H. Kim, Y. J. Reo, Y. W. Jun, A. Das, K. H. Ahn*, A benzocoumarin based two-photon fluorescent probe for ratiometric detection of bisulfite, ***Sensors And Actuators B-Chemical***, 2018, 277, 576-583 (I.F. = **5.667**).
4) H. G. Ryu, **S. Singha*** (*corresponding author), Y. W. Jun, Y. J. Reo, and K. H. Ahn*, Two-photon fluorescent probe for hydrogen sulfide based on a red-emitting benzocoumarin dye, ***Tetrahedron Letters***, 2018, 59, 49-53 (I.F. = 2.125).
5) **S. Singha*** (*corresponding author), D. Kim, S. Bhuniya, T. Kumeria, Fluorescence analysis: from sensing to imaging, ***Journal of Analytical Methods in Chemistry***, 2018, 2654127 (I.F. = 1.262).
6) S. Sarkar, M. Santra, **S. Singha**, Y. W. Jun, Y. J. Reo, H. R. Kim, K. H. Ahn, Two-photon absorbing 8-hydroxy-benzo[g]coumarins with giant Stokes shift: an environment-insensitive dye platform for probing biomolecules, ***Journal of Materials Chemistry B***, 2018, 6, 4446-4452 (I.F. = 4.776).

2017

7) Y. W. Jun, S. Sarkar, **S. Singha*** (*corresponding author), Y. J. Reo, H. Kim, J.-J. Kim, Y.-T. Chang*, K. H. Ahn*, A two-photon fluorescent probe for ratiometric imaging of endogenous hypochlorous acid in live cells and tissues, ***Chemical Communications***, 2017, 53, 10800-10803 (I.F. = **6.290**).
8) **S. Singha**, Y. W. Jun, J. Bae, K. H. Ahn, Ratiometric imaging of tissue by two-photon microscopy: observation of a high level of formaldehyde around mouse intestinal crypts, ***Analytical Chemistry***, 2017, 89, 3724-3731 (I.F. = **6.042**).
9) P. Singh, S. Choudhury, **S. Singha**, Y. Jun, S. Chakraborty, J. Sengupta, R. Das, K. H. Ahn, S. K. Pal, A sensitive fluorescent probe for the polar solvation dynamics at protein–surfactant interfaces, ***Physical Chemistry Chemical Physics***, 2017, 19, 12237-12245 (I.F. = 3.906).
10) H. Seo, **S. Singha**, K. H. Ahn, Ratiometric fluorescence detection of anthrax biomarker with Eu(III)-EDTA functionalized mixed poly(diacetylene) liposomes, ***Asian Journal of Organic Chemistry***, 2017, 6, 1257-1263 (I.F. = 2.496).
11) C. Hine, H.-J. Kim, Y. Zhu, E. Harputlugil, A. Longchamp, M. S. Matos, P. Ramadoss, L. Brace, J. M. Asara, C. K. Ozaki, S.-y. Cheng, **S. Singha**, K. H. Ahn, A. Kimmelman, F. M. Fisher, P. Pissios, D. J. Withers, C. Selman, R. Wang, K. Yen, V. Longo, P. Cohen, A. Bartke, J. J. Kopchick, R. Miller, A. Hollenberg, J. R. Mitchell, Hypothalamic-pituitary axis regulates hydrogen sulfide production, ***Cell Metabolism***, 2017, 25, 1320-1333 (I.F. = **20.565**).

2016

12) H.-J. Lee†, C.-W. Cho, H. Seo†, **S. Singha**† (†co-first author), Y. W. Jun, K.-H. Lee, Y. Jung, K.-T. Kim, S. Park, S. C. Bae, K. H. Ahn, A two-photon fluorescent probe for lysosomal zinc ions, ***Chemical Communications***, 2016, 52, 124-127 (I.F. = **6.290**).
13) **S. Singha**, K. H. Ahn, Detection of ciprofloxacin in urine through sensitized lanthanide luminescence, ***Sensors***, 2016, 16, 2065 (I.F. = 2.475).

2015

14) **S. Singha**, D. Kim, H. Seo, S. W. Cho, K. H. Ahn, Fluorescence sensing systems for gold and silver species, ***Chemical Society Reviews***, 2015, 44, 4367-4399 (I.F. = **40.182**).
15) D. Kim†, H. Moon†, S. H. Baik†, **S. Singha**† (†co-first author), Y. W. Jun, T. Wang, K. H. Kim, B. S. Park, J. Jung, I. Mook-Jung, K. H. Ahn, Two-photon absorbing dyes with minimal autofluorescence in tissue imaging: application to in vivo imaging of amyloid-beta plaques with a negligible background signal, ***Journal of the American Chemical Society***, 2015, 137, 6781-6789 (I.F. = **14.357**).
16) **S. Singha**, D. Kim, B. Roy, S. Sambasivan, H. Moon, A. S. Rao, J. Y. Kim, T. Joo, J. W. Park, Y. M. Rhee, T. Wang, K. H. Kim, Y. H. Shin, J. Jung, K. H. Ahn, A structural remedy toward bright dipolar fluorophores in aqueous media, ***Chemical Science***, 2015, 6, 4335-4342 (I.F. = **9.063**).
17) **S. Singha**, D. Kim, H. Moon, T. Wang, K. H. Kim, Y. H. Shin, J. Jung, E. Seo, S.-J. Lee, K. H. Ahn, Toward a selective, sensitive, fast-responsive, and biocompatible two-photon probe for hydrogen sulfide in live cells, ***Analytical Chemistry***, 2015, 87, 1188-1195 (I.F. = **6.042**).
Highlighted in "Chemical & Engineering (C & EN) News" as "Sniffing out hydrogen sulfide in cells" on January 5, 2015.
Technology transferred & license agreement for commercialization with Merck Inc. (EMD Millipore), USA.
18) M. Tasior, D. Kim, **S. Singha**, M. Krzeszewski, K. H. Ahn, D. T. Gryko, π-Expanded coumarins: synthesis, optical properties and applications, ***Journal of Materials Chemistry C***, 2015, 3, 1421-1446 (I.F. = **5.976**).

2013

19) **S. Singha**, D. Kim, S. Rao, T. Wang, K. H. Kim, K. Lee, K. Kim, K. H. Ahn, Two-photon probes based on arylsulfonyl azide: fluorescence detection and imaging of biothiols, ***Dyes and Pigments***, 2013, 99, 308-315 (I.F. = 3.767).

2012

20) D. Kim, **S. Singha**, T. Wang, E. Seo, J. H. Lee, S. J. Lee, K. H. Kim, K. H. Ahn, In vivo two-photon fluorescence imaging of fluoride with a desilylation-based reactive probe, ***Chemical Communications***, 2012, 48, 10243-10245 (I.F. = **6.290**).
21) A. S. Rao, **S. Singha**, W. Choi, K. H. Ahn, Studies on acedan-based mononuclear zinc complexes toward selective fluorescent probes for pyrophosphate, ***Organic & Biomolecular Chemistry***, 2012, 10, 8410-8417 (I.F. = 3.423).

2007

22) L. Rajput, **S. Singha**, K. Biradha, Comparative structural studies on homologues of amides and reverse amides: unprecedented 4-fold interpenetrated quartz network, new beta-sheet, and two-dimensional layers, ***Crystal Growth & Design***, 2007, 7, 2788-2795 (I.F. = 3.972).

Conference Paper Publication

1) **S. Singha**, Y. W. Jun, J. Bae, Y. J. Reo, K. H. Ahn, Ratiometric tissue imaging for formaldehyde detection in mouse intestinal crypts, in Proceedings of the 3rd International Conference on Sensors Engineering and Electronics Instrumentation Advances (SEIA' 2017), 20-22 September, 2017, Moscow, Russia, pp.220-222.

Book Chapter Publication

1) **S. Singha*** (*corresponding author), 'Fluorescence detection of ciprofloxacin' in M. S. Attia (ed.), *Ciprofloxacin: Biosynthesis, Applications, and Adverse Effects*, Hauppage, NY: Nova Science Publishers, 2019, pp.265-293.

Patent Publications

Accepted/Granted

1) K. H. Ahn, D. Kim, **S. Singha**, One-photon and/or two-photon fluorescent probes for hydrogen sulfide, biological imaging method of hydrogen sulfide using the same and synthesis method of the same, Awarding Organization: ***Korean*** *Intellectual Property Office*, Registration number: KOR 10-1481921 (Registration date: 06.01.2015). ***Technology transferred & license agreement for commercialization with Merck Inc., USA.***
2) K. H. Ahn, D. Kim, H. Moon, **S. Singha**, B. Roy, S. Sunderraman, Novel two-photon absorbed fluorophore and cellular imaging method using the same, Awarding Organization: ***Korean*** *Intellectual Property Office*, Registration number: KOR 10-1662444 (Registration date: 27.09.2016).

Application Filed

3) K. H. Ahn, D. Kim, **S. Singha**, One-photon and/or two-photon fluorescent probes for hydrogen sulfide, biological imaging method of hydrogen sulfide using the same and synthesis method of the same, Organization: ***United States*** *Patents and Trademark Office*, Patent Application No: US 15/037,168 (Application date: 17.05.2016).
4) K. H. Ahn, D. Kim, H. Moon, **S. Singha**, B. Roy, S. Sunderraman, Novel two-photon absorbed fluorophore and cellular imaging method using the same, Organization: ***United States*** *Patents and Trademark Office*, Patent Application No: US 15/512,624 (Application date: 20.03.2017).
5) K. H. Ahn, Y. W. Jun, H. Kim, **S. Singha**, Y. J. Reo, Benzocoumarin based two-photon absorbing fluorescent dyes, Organization: ***United States*** *Patents and Trademark Office*, Patent Application No: US 15/955,877 (Application date: 18.04.2018).
6) K. H. Ahn, Y. W. Jun, J. Bae, H. G. Ryu, **S. Singha**, Probes for detecting formaldehyde or measuring formaldehyde concentration, two-photon ratiometric fluorescence imaging and concentration measurement of formaldehyde in cell or tissue using the same, Organization: ***Korean*** *Intellectual Property Office*, Patent Application No: KOR 10-2016-0124841 (Application date: 28.09.2016).
7) K. H. Ahn, Y. W. Jun, H. Kim, **S. Singha**, Y. J. Reo, Benzocoumarin based two-photon absorbing fluorescent dyes, Organization: ***Korean*** *Intellectual Property Office*, Patent Application No: KOR 10-2017-0078999 (Application date: 22.06.2017).
8) K. H. Ahn, H. G. Ryu, Y. W. Jun, K. H. Kim, **S. Singha**, One- or two-photon absorbing fluorescent dyes based on amino-Si-pyronin compound and the uses thereof; Organization: ***Korean*** *Intellectual Property Office*, Patent Application No: KOR 10-2018-0102776 (Application date: 30.08.2018).

Sponsored Project Undertaken

Sponsored by: **National Research Foundation (NRF) of Korea** for Basic Science Research Program
Project Title: **Hydrogen Sulfide Triggered Drug Delivery for Theranostics**
Principal Investigator (PI): **Subhankar Singha**
Award no: 2018R1D1A1B07051403; Periods: Jun, 2018 ~ May, 2023 (5 years)
Total grant amount: 250,000 Thousand Korean Won (approx. 220,000 USD)

Technology Transfer & License Agreement for Commercialization

Product name: **H_2S Fluorescent Probe, P3 - Calbiochem®**
Supplier: **EMD Millipore, Merck** (Catalogue Number: 534329), USA
Description: A cell-permeable, specific, sensitive, fast-responsive fluorescent turn-on H_2S probe. Monitors endogenous [H_2S] in live cells by two-photon imaging
Reference: **S. Singha**, et al. *Analytical Chemistry*, **2015**, 87, 1188

Conference Presentations (Oral)

1) "Ratiometric imaging of endogenous hypochlorous acid with a two-photon fluorescent probe", ***Oral presentation***, Korea Society of Organic Synthesis Conference, 2017 (Sep, 21-22), Sungkyunkwan University (SKKU), Seoul, South Korea.
2) "Design and synthesis of a ratiometric two-photon probe for quantitative observation of formaldehyde in sub-organ tissues", ***Oral presentation***, Korea Society of Organic Synthesis Conference, 2016 (Sep, 29-30), Korea Advanced Institute of Science & Technology (KAIST), Daejeon, South Korea.

Invited Lecture Presentation

- "Fluorescence Bioimaging and Biosensing: Future Perspectives in Theranostics", *Invited lecture*, National Institute of Pharmaceutical Education and Research (NIPER) - Kolkata, 31st Aug, 2018.

Honors, Awards, & Achievements

- Awarded Fund from **National Research Foundation (NRF)**, South Korea for Basic Science Research Program for 5 years, Project title: Hydrogen sulfide triggered drug delivery for theranostics, Award No.: 2018R1D1A1B07051403 (Jun, 2018-May, 2023).
- **Research Assistant Professor Fellowship** (financial support) from Global Research Laboratory (GRL) program, South Korea (Oct, 2015-present).
- **Post-Doctoral Research fellowship** from Center for Electro-Photo Behaviors in Advanced Molecular Systems (EPB center), South Korea (Aug, 2013-Feb, 2015).
- **CSIR-UGC NET** (National Eligibility Test) Examination qualified (Exam date: 24th Dec, 2006) in India.
- **MCM** (Merit cum Means) **Scholarship** from IIT Kharagpur, 2005-2007.
- **All India Rank 59th in JAM** (Joint Admission Test for M.Sc. in IITs), 2005.

Editorial & Reviewer Experiences

- **Lead Guest Editor** for **Journal of Analytical Methods in Chemistry** (Hindawi Publishing Corporation) for the special publication issue on "Fluorescence analysis: From sensing to imaging" (2017-2018).
- **Academic Editor** for **Journal of Analytical Methods in Chemistry** (2017-2018).
- **Reviewer** for-

  Royal Society of Chemistry (Journal of Materials Chemistry B, Organic & Biomolecular Chemistry, Photochemical & Photobiological Science),
  Elsevier (Sensors and Actuators B: Chemical, Journal of Luminescence, Microchemical Journal),
  MDPI (Molecules, Chemosensors, Sensors, Applied Science, Diagnostics, Dentistry Journal),
  Bentham Science (Current Analytical Chemistry),
  Sciencedomain International (Journal of Pharmaceutical Research International)