SHUBHAM BANSAL, Ph.D.

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RESEARCH PROFILE

Medicinal chemist and chemical biologist developing novel imaging and precision drug delivery tools/techniques. Developed redox-responsive chemical tools for molecular imaging, reactive oxygen species (ROS) biology, and precision drug delivery. Research integrates organic chemistry, analytical chemistry, chemical biology, and translational imaging to design and develop probes and prodrugs.

Developed multiple conceptual advances in ROS research, including the discovery that commonly used solvents (DMSO), buffers, and cell culture media can fundamentally alter ROS measurements and the development of novel redox-responsive probes capable of monitoring both oxidative and reductive stress. Research has resulted in multiple peer-reviewed publications, patent applications, and prestigious awards.

SELECTED CONCEPTUAL CONTRIBUTIONS

- Conceived and developed a bidirectional fluorescent probe for simultaneous detection of oxidative and reductive stress in living cells, providing a new way to monitor dynamic changes in cellular redox environments. Beyond this dual redox-sensing capability, this work introduces a new chemistry of selective sulfone reduction in hypoxia, opening new opportunities for the development of hypoxia-responsive fluorescent probes.
- Identified and demonstrated that commonly used solvents (DMSO), buffers, and cell culture media can skew experimental results and their interpretations. Additionally, provided a framework that improves future work.
- Developed new ROS-responsive prodrug system and co-inventor on two patent applications involving redox-responsive probes and prodrug technologies.
- Mentored Ph.D. and M.S. students and instructed Organic Chemistry I & II and General Chemistry labs.

Research metrics (as of Aug 2026)	
Total Peer-reviewed publications	10
First-author publications	7
Total citations	252
h-index	5
Patents filed	2
Journal cover articles	3
Articles in peer review	3

EDUCATION

Doctor of Philosophy (Ph.D.), Organic Chemistry — *June **2022** – May **2026***
College of Arts & Sciences, Georgia State University, Atlanta, GA, USA (*Advisor: **Dr. Binghe Wang***)

Master of Science (M.S.), Chemistry — *Jan **2021** – May **2022***
College of Arts & Sciences, Georgia State University, Atlanta, GA, USA (*Advisor: **Dr. Binghe Wang***)

Master of Science (M.S.), Pharmaceutical Chemistry — Aug **2016** – Nov **2018**
M.M. Modi College, Punjabi University, Patiala, Punjab, India (*Advisor: **Dr. Sanjay Kumar***)

Bachelor of Science (B.S.) — Aug **2013** – May **2016**
M.M. Modi College, Punjabi University, Patiala, Punjab, India

WORK EXPERIENCE

Yale University, New Haven, CT, USA
Postdoctoral Associate — June **2026** – Present

Georgia State University, Atlanta, GA, USA
Graduate Teaching & Research Assistant — Jan **2021** - Dec **2023**

M.M. Modi College, Punjabi University, Punjab, India
Researcher - Synthetic Methodology — Aug **2016** - Aug **2021**

PATENTS

1) Wang, B.; **Bansal, S.**; Gori, M. Bidirectional Redox-responsive fluorescent probes and methods of use, *Patent Pending*, application number: 64/091,187, **2026**.
2) Wang, B.; **Bansal, S.**; Kondengadan, S. M. Redox-sensitive prodrugs and methods of use thereof, USA, *Patent Pending*, application number: 63/805,452, **2025**.

PUBLICATIONS | GOOGLE SCHOLAR

Peer-Reviewed Publications

1) **Bansal, S.**; Gori, M.; Wang, B. One Stone Two Birds: Novel Fluorescent Probe Chemistry that Detects Redox Stress in Both Directions in Cell Culture. *Anal Chem* **2026,** https://doi.org/10.1021/acs.analchem.6c02835

2) **Bansal, S.**; Wang, B. Reactive Oxygen Species (ROS) Research in Drug Discovery and Drug Delivery: Can the Medium Be a Trojan Horse Disguised as Something Benign? *J Enzyme Inhib Med Chem* **2026**, *41*(1), 2631215.
3) Kondengadan, S. M.;* **Bansal, S.;*** Lu, W., Chaudhary, M. R.; Wang, B. Targeting Highly Reactive Oxygen Species (hROS) for Prodrug Activation through a Cascade Reaction with Kinetic Tunability (CReKT) to Effect Linker Cleavage *J Med Chem* **2026**, 69(8), 9196-9214.
    - **Co-first Author*
    - ***Highlighted on the Journal's front cover page.***
4) **Bansal, S.**; Gori, M.; Quaye, J.A.; Gadda, G.; Wang, B. Detection and Analysis of Reactive Oxygen Species (ROS): Buffer Components Are Not Bystanders. *Anal Chem* **2025,** *97* (28), 14931-14942.
    - ***Highlighted on the Journal's front cover page.***
5) Lyles, K. V.; Stone, S.; Singh, P.; Patterson, L. D.; Natekar, J.; Pathak, H.; Varshnaya, R. K.; Elsharkawy, A.; Liu, D.; **Bansal, S.**; et al. Entry Inhibitors of SARS-CoV-2 Targeting the Transmembrane Domain of the Spike Protein. *Viruses* **2025**, *17* (7), 989.
6) Abdelfattah, A.G.;*** Bansal, S.;*** Joanna, A.K.; Kondengadan, S. M.; Gadda, G.; Wang, B. Thioether Oxidation Chemistry in Reactive Oxygen Species (ROS)-sensitive Trigger Design: A Kinetic Analysis. *Org Lett* **2025**, 27 (12), 3071-3076.
    - **Co-first Author*
7) **Bansal, S.**; Wang, B. A critical factor in reactive oxygen species (ROS) studies: the need to understand the chemistry of the solvent used: the case of DMSO. *Chem Sci* **2024**, *15* (43), 17843-17851.
    - ***Highlighted on the Journal's cover page.***
    - ***Among the most popular analytical chemistry articles from the journal in 2024.***
8) **Bansal, S.;*** Liu, D.;* Mao, Q.;* Bauer, N.; Wang, B. Carbon Monoxide as a Potential Therapeutic Agent: A Molecular Analysis of Its Safety Profiles. *J Med Chem* **2024**, *67* (12), 9789-9815.
    - **Co-first Author*
9) Kondengadan, S. M.; **Bansal, S.**; Yang, X.; Wang, B. Folate-conjugated organic CO prodrugs: Synthesis and CO release kinetic studies. *Med Chem Res* **2024**, *33* (8), 1410-1422.
10) Kondengadan, S. M.; **Bansal, S.**; Yang, C.; Liu, D.; Fultz, Z.; Wang, B. Click chemistry and drug delivery: A bird's-eye view. *Acta Pharm Sin B* **2023**, *13* (5), 1990-2016.

Submitted

11) **Bansal, S.**; Wang, B. Ensuring Rigor in Reactive Oxygen Species (ROS) Research: The SKACS Guardrails. *Anal Chem* **2026**, *in peer review.*
12) Nguyen, T.; **Bansal, S.**; Singh, P., Nagaraju, N.; Hamelberg, D.; Wang, B. Targeting Highly Reactive Oxygen Species (hROS) for Prodrug Activation Using the CReKT Approach II: The Effect of Aryl Substitution on Release Kinetics. *J Org Chem* **2026**, *in peer review*.

DISSERTATION AND THESIS

1) **Ph.D. Dissertation:** Bansal, Shubham. **2026**. "Reactive Oxygen Species (ROS) Research: From Fundamental Insights to Practical Applicable Tools." Dissertation, Georgia State University. http://doi.org/10.57709/67
2) **M.S. Thesis:** Bansal, Shubham. "Bioreversible Derivatization of Drug Molecules with a Pyridine Ring for Improved Water Solubility: Model Studies." Thesis, Georgia State University, **2022**. https://doi.org//10.57709/29000717

BOOK CHAPTERS

1) Liu, D.; **Bansal, S.**; Gori, M.; Wang, B. Click Chemistry in Delivering Gaseous Signaling Molecules. Topics in Heterocyclic Chemistry; Springer Nature; **2026**, DOI: 10.1007/7081_2025_104
2) **Bansal, S.**; Singh, P.; Liu, D.; Wang, B. Reactive Oxygen Species (ROS)-sensitive Drug Delivery: Current State and Future Needs. Drug Delivery: Principles and Applications; Wang, B., Ed.; Wiley; **2025**, *accepted*.
3) **Bansal, S.**; Challa, S.; Wang, B. Mitochondrion-targeted Drug Delivery. Drug Delivery: Principles and Applications; Wang, B., Ed.; Wiley; 2025, *accepted*.

PROFESSIONAL SERVICE

Reviewer for research article

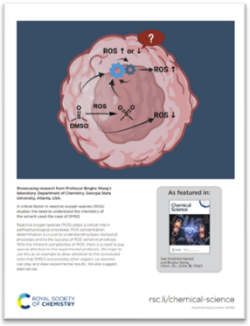
1) ACS Omega, ACS Publications **2025**-present
    10+ research papers reviewed

2) Biocell – research paper reviewed **2025**

Judge

3) Georgia State Undergraduate Research Conference (GSURC), at Georgia State University April 11, **2024**
4) **2022** MBD & NSF-REU Undergraduate Research at Georgia State University July 29, **2023**

JOURNAL COVERS




AWARDS | FELLOWSHIPS | MEMBERSHIPS

1) Center for Diagnostics and Therapeutics (CDT) "Fellow of the year" award May 05, **2026**
2) Dean's Graduate Research Grants award (**$500**) April 14, **2026**
3) **David W. Boykin Graduate Fellowship in Medicinal Chemistry ($4000)** March 20, **2026**
4) **Panther innovator awards**, Georgia State University, Atlanta, Georgia, USA Feb 10, **2026**
5) Georgia State University Graduate Scholar Travel Award **($500**) Aug 29, **2025**
6) **Invited Full Member of *Sigma Xi, The Scientific Research Honor Society.*** Aug 12, **2025**
7) Awarded "Outstanding Talk Award" and **$1000 travel award** at Chemistry Graduate Student Association (CGSA) Spring Symposium, Georgia State University, Atlanta, Georgia, USA May 23, **2025**
8) **David W. Boykin Graduate Fellowship in Medicinal Chemistry ($4000)** Feb 28, **2025**
9) **Center for Diagnostics and Therapeutics (CDT) Fellowship, Georgia State University, Atlanta, Georgia, USA** (**2022 – 2026**)
10) Awarded **prize** in poster presentation in CDT's poster session, Georgia State University, Atlanta, Georgia, USA Dec 12, **2022**
11) Awarded **prize** in poster presentation in RACES-2019 conference April **2019**
12) Awarded "College Color" **prize** for securing fourth position in MS program in Punjabi University, Patiala, Punjab, India March **2019**
13) Awarded 3rd prize in quiz competition at National Science Day Celebration- 2017 at Thapar University, Patiala, India. Feb **2017**
14) Awarded 2nd prize in quiz competition at National Science Day Celebration- 2016 at Thapar University, Patiala, India. Feb **2016**

CONFERENCES | SCIENTIFIC MEETINGS

Oral talk

1) "Reactive Oxygen Species (ROS)-Sensitive Drug Delivery: A Novel Prodrug Approach with On-Demand Release and Tunable Release Kinetics" at ACS Spring 2026 on March 25, **2026**.
2) "Oxidative Stress Research: Critical Factors Causing Experimental Errors" at ACS Spring 2026 on March 22, **2026**.
3) "Pitfalls in Reactive Oxygen Species (ROS) Detection: Solvent and Buffer Components Are Not Bystanders" at Pacifichem 2025, Honolulu, Hawaii, December 19, **2025**.
4) "ROS-Activated Novel Linker System That Releases Drug via a Bioorthogonal Reaction" at Pacifichem 2025, Honolulu, Hawaii, December 18, **2025**.
5) "Critical Factors in Reactive Oxygen Species (ROS) Detection: The Need to Understand the Chemistry of the Solvent Used: Case of DMSO" at Pacifichem 2025, Honolulu, Hawaii, December 17, **2025**.
6) "Oxidative Stress Research: Critical Factors Causing Experimental Errors" at 2025 International Forum on Research Excellence, organized by Sigma Xi, virtual meeting, October 30 – November 1, **2025**.
7) "Reactive Oxygen Species (ROS)-Sensitive Drug Delivery: Back to the Fundamentals" at Joint Meeting of SERMACS/SWRM 2025, Orlando, Florida, USA on October 26, **2025**.

8) "Pitfalls in Reactive Oxygen Species (ROS) Research: Solvent and Buffer Components Are Not Bystanders" at Chemistry Graduate Student Association (CGSA) Spring Symposium, Georgia State University, Atlanta, Georgia, USA on May 23, **2025**.
    - ***Awarded "Outstanding Talk Award"***
    - ***Awarded $1000 travel award.***

Poster

9) "Reactive Oxygen Species (ROS) Research: Lacking Attention to Fundamental Chemistry Issues Can Lead to mis-leading Results" (Poster) at the Society for Redox Biology and Medicine's (SfRBM) 32nd Annual Conference, Washington DC, USA on November 19-22, **2025**.
    - *Abstract published: Free Radical Biology and Medicine **2025**, 240, S15. https://doi.org/10.1016/j.freeradbiomed.2025.10.048*
10) "Pitfalls in Reactive Oxygen Species (ROS) Research: Solvent and Buffer Components Are Not Bystanders" (Poster) at 44th Annual Meeting of the Biological Stain Commission at Georgia State University, Atlanta, Georgia, USA on October 31, **2025**.
11) "Detection and Analysis of Reactive Oxygen Species (ROS): Solvent and Buffer Components Cause Experimental Errors" (Poster) at 76th Midwestern Universities Analytical Chemistry Conference, University of North Carolina at Chapel Hill, North Caroline, USA on October 16-17, **2025**.
12) "Pitfalls in Reactive Oxygen Species (ROS) Research: Solvent and Buffer Components Are Not Bystanders" (Poster) at Southeastern Chemical Biology and Drug Discovery Symposium (SCBDDS), University of Georgia, Athens, Georgia, USA on May 21, **2025**.
13) "Critical factors in reactive oxygen species (ROS) detection: solvents are not bystanders: case of DMSO" (Poster) at the 2025 Brains & Behavior Annual Retreat, Georgia State University, Atlanta, Georgia, USA on May 9, **2025**.
14) "Detection and Analysis of Reactive Oxygen Species (ROS): Buffer Components Are Not Bystanders" (Poster) at 15th Annual Southeast Enzyme Conference, Georgia State University, Atlanta, Georgia, USA on April 26, **2025**.
15) "Critical factor in reactive oxygen species (ROS) studies: the need to understand the chemistry of the solvent used" (Poster) at the ACS Spring 2025, San Diego, California, USA on March 23, **2025**.
    - ***Research work selected for the digital poster presentation as well.***
16) 75th Southeastern Regional Meeting of the American Chemical Society (SERMACS), American Chemical Society (ACS), Atlanta, Georgia, USA on Oct 23-24, **2024**. (Attendance)
17) "Folate-conjugated organic CO prodrugs: Synthesis and CO-release kinetic studies" (Poster) at the Southeastern Chemical Biology and Drug Discovery Symposium (SCBDDS), University of Georgia, Athens, Georgia, USA on May 14, **2024**.
18) "Folate-conjugated organic CO prodrugs: Synthesis and CO-release kinetic studies" (Poster) at the Spring Research Symposium, Georgia State University, Atlanta, Georgia, USA on May 3, **2024**.
19) Midwest Antiviral Drug Discovery (AViDD) Center Annual Conference, UF Scripps Institute for Biomedical Innovation & Technology, Jupiter, Florida, March 30th-31st, **2023**. (Attendance)
20) "Development of A Novel ROS Triggered Drug Delivery System" (Poster) at the Center for Diagnostics and Therapeutics (CDT) poster session, Georgia State University, Atlanta, Georgia, USA on Dec 12, **2022**.
    - ***Awarded best poster presentation award.***
21) Midwest Antiviral Drug Discovery (AViDD) Center Annual Conference, University of Minnesota, Minneapolis, October 27, **2022**. (Attendance)

During MS

22) "SuccinimidiniumN-sulfonic acid hydrogen sulfate an efficient Ionic liquid catalyst for the synthesis of pyrano[3,2-c]coumarins under solvent-free conditions" (Poster) at Recent Advances in Chemical and Environmental Sciences (RACES-2019), Multani Mal Modi College, Patiala in April **2019**.
    - ***Awarded best poster presentation award.***
23) "Ionic liquid catalyzed synthesis of tetrahydropyrimidine-2[1H]-one" (Oral presentation) at Emerging Scenario in Basic and Applied Science for Sustainable Development, DAV College, Bathinda, Punjab in April **2018**.
24) "Multicomponent, one pot synthesis of 2-amino-5,7-dihydroxy-4-phenyl-1,4-dihydroquinoline-3-carbonitrile derivatives" (Poster) at Chemical and Environmental Sciences: Innovation and Advances-2018, Punjabi university, Patiala in Feb **2018**.
25) "Ionic liquid mediated fast and efficient synthesis of tetrahydropyrimidine-2[1H]-one" (Poster) at Recent Advances in Chemical, Biological and Environmental Sciences (RACES-2018), Multani Mal Modi College, Patiala in Feb **2018**.

SKILLS | INSTRUMENTAL | TECHNICAL | PROFESSIONAL | PERSONAL

- **Medicinal & Organic Chemistry**: Chemical synthesis, Medicinal chemistry, small-molecule drug discovery, hit identification, lead optimization; Structure-activity relationship (SAR) analysis and hypothesis-driven molecular design; multi-step organic synthesis, reaction optimization, scale-up synthesis; Synthetic methodology development, bioorthogonal chemistry, click chemistry; Prodrug design, redox-responsive chemistry, chemical probe development.
- **Analytical & Characterization:** NMR spectroscopy (^{1}H, ^{13}C), FTIR, HPLC, LC-MS, MS.; RP-HPLC (analytical and preparative), flash chromatography (Biotage, CombiFlash, puriFlash); Gas chromatography (GC), UV-Vis spectroscopy, fluorescence spectroscopy; Compound purification, structural characterization, purity assessment.
- **Chemical Biology & Translational Research:** Cell culture (mammalian), cell-based assays, intracellular compound quantification; Cell imaging, fluorescence microscopy, flow cytometry; Mitochondrial isolation, biological sample preparation; Data interpretation linking chemical structure to biological activity.
- **Data Analysis & Scientific Rigor:** Experimental design, hypothesis testing, SAR-driven decision-making; Scientific literature analysis, competitive landscape assessment; Reproducibility, troubleshooting, root-cause analysis.
- **Project & Program Skills:** Research project management, milestone planning, prioritization; Cross-functional collaboration with biologists, enzymologists, and virologists; Documentation, technical reporting, data presentation to diverse audiences.
- **Leadership & Communication:** Scientific writing (manuscripts, patents, reports); Oral presentations (internal reviews and conferences); Mentoring and training junior researchers; Effective communication across multidisciplinary teams.
- **Professional:** Strategic thinking, adaptability, initiative, attention to detail; Time management, ownership of projects, independent problem-solving; Trilingual: English, Hindi, Punjabi.