Curriculum Vitae (August 2024)

Dr. Rajeev B Dabke
Department of Chemistry, 4225 University Avenue
Columbus State University, Columbus, GA 31907
(Tel: 706 569 3029 Fax: 706 569 3133 Email: dabke_rajeev@columbusstate.edu)

PERSONAL INFORMATION:	**EDUCATION:**
Rajeev B Dabke Academic Rank: Professor (*tenured*), Department of Chemistry Citizenship: US, Nation of Origin: India	PhD: Department of Chemistry, University of Pune, Pune 411007, India Subject: Physical Chemistry, Supervisor: Professor T.S. Rao Thesis Title: Studies on the Inhibition of Oxidation of Hemoglobin from Kinetic Measurements MS: Department of Chemistry, University of Pune, Pune 411007, India Major: Physical Chemistry BS: Department of Chemistry, Fergusson College, Pune 411004, India Major: Chemistry

RECENT ACADEMIC APPOINTMENTS AND OTHER SIGNIFICANT WORK EXPERIENCE:

2015- : Professor of Chemistry
2010-2015 : Associate Professor of Chemistry
Department of Chemistry, Columbus State University, Columbus, GA 31907
Teaching Responsibilities: Introductory Courses: Principles of Chemistry, Survey of Chemistry, and corresponding laboratory courses
Upper-Level Courses: Physical Chemistry, and Corresponding Laboratory Courses
Advanced Level Courses: Electrochemical Methods

2003- 2010: Assistant Professor of Chemistry
Department of Chemistry, Columbus State University, Columbus, GA 31907
Teaching Responsibilities: Principles of Chemistry, Survey of Chemistry, Physical Chemistry, and Corresponding Laboratory Courses

2002- 2003: Assistant Professor of Chemistry (*on contract*)
Department of Chemistry, Columbus State University, Columbus, GA 31907
Teaching Responsibilities: Principles of Chemistry, Survey of Chemistry, Physical Chemistry, and Corresponding Laboratory Courses

1999-2002: Postdoctoral Research Associate
Department of Chemistry, University of California, Riverside CA 92521
Supervisors: Professors Werner G Kuhr and David F Bocian

Project Title: Electrochemical Characterization of Redox Self-Assembled Monolayers for Molecular Memory Applications

1996-1999: Lecturer in Physical Chemistry
Department of Chemistry, University of Mumbai, Mumbai (formerly Bombay) 400 098, India
Teaching Responsibilities: Physical Chemistry- Thermodynamics, Electrochemistry (ionics), Fundamental Nuclear Chemistry and laboratory courses in Physical Chemistry (equilibrium, kinetics, and electrochemistry)

1993-1995: Postdoctoral Research Associate
Department of Chemistry, Indian Institute of Technology, Powai, Mumbai 400 076, India
Supervisor: Professor A. Q. Contractor
Project Title: Electrochemical Studies on the Molecular Electronic Devices

1988-1992: Junior Research Fellowship (Special grant program for the PhD thesis research work sponsored by the University Grants Commission, India)
Department of Chemistry, University of Pune, Pune 411007, India

RESEARCH FIELD(S) or AREA(S) OF SPECIAL INTEREST WITHIN DISCIPLINE OR PROFESSION:

- Electrochemical methods of analysis
- Development of chemistry learning modules for visually impaired students
- Undergraduate chemistry curriculum development in general chemistry and physical chemistry
- Enhancing undergraduate hands-on laboratory experience in general, physical, & analytical chemistry and developing new laboratory experiments

TEACHING:

- Currently teaching introductory, upper level, and advanced level courses
- Developed a new advanced level course on electrochemical methods
- Developing new undergraduate experiments in physical, analytical, and general chemistry and blending curriculum with the real-world experience
- Developing hands-on activities and demonstrations for high school and undergraduate students
- Developing hands-on learning modules for blind and visually impaired students (see list of publications)
- Prior teaching experience includes areas of physical chemistry, basic- and applied electrochemistry

ASSOCIATING WITH THE UNDERGRADUATE STUDENTS AND COLLABORATING WITH FACULTY MEMBERS:

In the past years, over twenty undergraduate students under my supervision participated in research projects in chemical education, electrochemistry, and analytical chemistry. Several projects

resulted in publications co-authored by these students. Several students had an opportunity to present their research at local or national conferences. Several senior undergraduate students have been peer-leading general chemistry courses instructed by me. I also had an opportunity to collaborate with my colleagues on research projects (within discipline and interdisciplinary).

PROFESSIONAL ACTIVITIES:

Peer Reviewed Publications:

ORCID: Rajeev B Dabke 0000-0002-2825-071X

List of publications ***(in affiliation with the Columbus State University, Columbus, GA)***

"Feasibility of Using a Multicompartment Electrochemical Cell for Determination of Solubility Product Constants of Silver Salts from Potentiometric Measurements: A Directed Study in the Undergraduate Physical Chemistry Laboratory" Hilary Onbey, Kaitlin Stringfellow, Rajeev B. Dabke, Zewdu Gebeyehu, and Samuel Melaku *J. Chem. Educ.* **2023,** *100* (7), 2733–2738.

"Interlocking Toy Building Blocks as Teaching Modules for an Undergraduate Organic Chemistry-Based Course for Allied Health Majors" Rajeev B Dabke, Kerri L. Shelton, and Samuel Melaku *J. Chem. Educ.* **2022,** *99* (7), 2726–2732.

"QR Code Labels and Audio Commentaries for Commonly Used Chemistry Laboratory Apparatus: An Assisted Learning Experience for Visually Impaired Students" Rajeev B Dabke, Mary Harrell, Samuel Melaku, Lydia Ray, and Hannah Turner *J. Chem. Educ.* **2021,** *98* (10), 3395–3399.

"Interlocking Toy Building Blocks as Modules for Undergraduate Introductory and General Chemistry Classroom Teaching" Samuel Melaku, Rajeev B Dabke *J. Chem. Educ.* **2021,** *98* (7), 2465-2470.

"Using an Electrolytic Capacitor to Deliver Charge to an Electrolysis Cell: An Interdisciplinary Undergraduate Laboratory Titration Experiment" Dawson Dooley, Abiye Seifu, Jaimie Gonzalez, Shaquithea Harris, Jasmine Bohannon, Rajeev B Dabke *The Chemical Educator* **2020,** *25,* 45–49.

"Feasibility of Performing Concurrent Coulometric Titrations Using a Multicompartment Electrolysis Cell" Shaquithea Harris, Jaimie Gonzales, Samuel Melaku, and Rajeev B. Dabke *ACS Omega*, **2019,** *4* (2), pp 3684–3689. (DOI: 10.1021/acsomega.8b03141) *(ACS Author Choice, Peer Reviewed–Invited Submission*)

"Feasibility of Using an Electrolysis Cell for Quantification of the Electrolytic Products of Water from Gravimetric Measurement" Samuel Melaku, Zewdu Gebeyehu, and Rajeev B. Dabke *Journal of Analytical Methods in Chemistry* **2018,** *2018,* 1–5. (DOI:10.1155/2018/2681796)

"Interlocking Toy Building Blocks as Hands-On Learning Modules for Blind and Visually Impaired Chemistry Students" Samuel Melaku, James O. Schreck, Kameron Griffin, and Rajeev

B. Dabke *J. Chem. Educ.* **2016,** *93* (6), 1049–1055. (DOI: 10.1021/acs.jchemed.5b00252) (*ACS Author Choice Article*)

"Demonstrating Close-packing of Atoms Using Spherical Bubble Gums" Gebeyehu, Z.; Dabke, R. B. *SINET: Ethiop. J. Sci.* **2015,** *37*(1), 69–72.

"Quantitative Cathodic Preparation of Selected Aqueous Reagents Used in an Undergraduate Laboratory" Samuel Melaku and Rajeev B. Dabke *Journal of Chemical Education* **2015,** *92* (5), 958–961.

"An Alternative Approach for Preparing and Standardizing Some Common Aqueous Reagents Used in an Undergraduate Laboratory" Samuel Melaku and Rajeev B. Dabke *Journal of Chemical Education* **2014,** *91* (9), 1451–1454.

"Volumetric Titrations Using Electrolytically Generated Reagents for the Determination of Ascorbic Acid and Iron in Dietary Supplement Tablets: An Undergraduate Laboratory Experiment" Christopher Scanlon, Zewdu Gebeyehu, Kameron Griffin, and Rajeev B. Dabke *Journal of Chemical Education* **2014,** *91* (6), 898–901.

"An Alternative Approach to Titrating Fe^{2+}(aq) in Dietary Supplement Tablets Using Electrolytically Produced Ce^{4+}(aq)" Huirui Washington, Christopher Scanlon, Samuel Melaku, James O. Schreck, and Rajeev B. Dabke *The Chemical Educator* **2014,** *19,* 153-156.

"Helping Students Visualize the Electrolysis of Water by Using Acid-Base Indicators to Create Colorful Designs" Rajeev B. Dabke, James O. Schreck, Jacqueline McGuire, Eunhye Claire Cho *The Chemical Educator* **2013,** *18,* 287–289.

"Determining the Transference Number of H^+(aq) by a Modified Moving Boundary Method: A Directed Study for the Undergraduate Physical Chemistry Laboratory" Rajeev B. Dabke, Zewdu Gebeyehu, Jonathan Padelford *Journal of Chemical Education* **2012,** *89,* 1600-1603.

"Analysis of Ascorbic Acid in Supplement Tablets from the Mole Ratios of the Electrolytic Products: An Experiment for the Undergraduate Laboratory" Rajeev B Dabke, Zewdu Gebeyehu, Nicole Ippolito *The Chemical Educator* **2012,** *17,* 152-156.

"Using Mole Ratios of Electrolytic Products of Water for Analysis of Household Vinegar: An Experiment for the Undergraduate Physical Chemistry Laboratory" Rajeev B. Dabke and Zewdu Gebeyehu *Journal of Chemical Education* **2012,** *89* (9), 1198-1200.

"Coulometric Analysis Experiment for the Undergraduate Chemistry Laboratory" Rajeev B Dabke, Zewdu Gebeyehu, Ryan Thor *Journal of Chemical Education* **2011,** *88* (12), 1707–1710.

"Analysis of Household Products: Coulometric Titration Experiment in the Undergraduate Laboratory" Rajeev B Dabke, Zewdu Gebeyehu, Mary Petermann, Napoleon Johnson, Jr., and Krutik Patel *The Chemical Educator* **2011,** *16,* 160-163.

"A Versatile Apparatus for a Laboratory Demonstration of Anodic and Cathodic Reactions" Rajeev B Dabke and Josue Scott *The Chemical Educator* **2010,** *15,* 36-38. *(DOI 10.1007/s00897102258a)*

"Using Magnets, Paper Clips, and Ball Bearings to Explore the Shapes of Molecules" Rajeev B Dabke and Zewdu Gebeyehu *Journal of College Science Teaching* **2010,** *40* (2), 70-73.

A list of publications ***(prior to the affiliation with the Columbus State University, Columbus, GA)***

Measurements of Electron-Transfer Rates of Charge Storage Molecular Monolayers on Si(100). Towards Hybrid Molecular/Semiconductor Information Storage Devices. Roth, K. M.; Yasseri, A. A.; Liu, Zhiming; Dabke, R. B.; Malinovskii, V.; Karl-Heinz Schweikart, K-H.; Yu, L, Tiznado, H.; Zaera, F.;Lindsey, J. S.; Kuhr, W. G.; Bocian, D. *J. Am. Chem. Soc.* (2003), 125(2), 505-517.

Charge-Retention Characteristics of Self-Assembled Monolayers of "Molecular-Wire" Linked Porphyrins on Gold. Roth, Kristian M.; Dabke, R. B.; Liu, Zhiming; Yasseri, Amir; Gryko, D. T.; Clausen, Christian; Lindsey, Jonathan S.; Bocian, David, F.; Kuhr, W, G. *ACS Symp. Series* (2002) vol. 844.

Capacitance and Conductance Characterization of Ferrocene-Containing Self-Assembled Monolayers on Silicon Surfaces for Memory Applications. Li, Q.; Mathur, G.; Homsi, M.; Surthi, S.; Misra, V.; Malinovskii, V.; Schweikart, K-H.; Yu, L.; Lindsey, J. S.; Liu, Z.; Dabke, R. B.; Yasseri, A.; Bocian, D. F.; Kuhr, W. G. *App. Phys. Lett.* (2002), 81, 1494-1496.

Molecular approach toward information storage based on the redox properties of porphyrins in self-assembled monolayers. Roth, Kristian M.; Dontha, Narasaiah; Dabke, Rajeev B.; Gryko, Daniel T.; Clausen, Christian; Lindsey, Jonathan S.; Bocian, David F.; Kuhr, Werner G. *J. Vac. Sci. Technol., B* (2000), 18(5), 2359-2364.

Synthesis of Thiol-Derivatized Europium Porphyrinic Triple-Decker Sandwich Complexes for Multibit Molecular Information Storage. Li, Junzhong; Gryko, Dorota; Dabke, Rajeev B.; Diers, James R.; Bocian, David F.; Kuhr, Werner G.; Lindsey, Jonathan S. *J. Org. Chem.* (2000), 65(22), 7379-7390.

Synthesis of Thiol-Derivatized Porphyrin Dimers and Trimers for Studies of Architectural Effects on Multibit Information Storage. Clausen, Christian; Gryko, Daniel T.; Dabke, Rajeev B.; Dontha, Narasaiah; Bocian, David F.; Kuhr, Werner G.; Lindsey, Jonathan S. *J. Org. Chem.* (2000), 65(22), 7363-7370.

Electrochemistry of polyaniline Langmuir-Blodgett films. Dabke, R. B.; Dhanabalan, A.; Major, S.; Talwar, S. S.; Lal, R.; Contractor, A. Q. *Thin Solid Films* (1998), 335(1,2), 203-208.

A study of Langmuir and Langmuir-Blodgett films of polyaniline. Dhanabalan, A.; Dabke, R. B.; Kumar, N. Prasanth; Talwar, S. S.; Major, S.; Lal, R.; Contractor, A. Q. *Langmuir* (1997), 13(16), 4395-4400.

Preparation and characterization of mixed LB films of polyaniline and cadmium arachidate. Dhanabalan, A.; Dabke, R. B.; Datta, S. N.; Prasanth Kumar, N.; Major, S. S.; Talwar, S. S.; Contractor, A. Q. *Thin Solid Films* (1997), 295(1-2), 255-259.

An Ion-Activated Molecular Electronic Device. Dabke, R. B.; Singh, G. D.; Dhanabalan, A.; Lal, R.; Contractor, A. Q. *Anal. Chem.* (1997), 69(4), 724-727.

Conducting polymers: novel materials for chemical and bio-sensors. Lal, R.; Sukeerthi, S.; Dabke, R. B.; Contractor, A. Q. *Indian J. Pure Appl. Phys.* (1996), 34(9), 589-594.

Equilibrium constant of the oxidation of ascorbic acid (vitamin C): an experiment in biochemistry laboratory. Rao, T. S.; Dabke, R. B.; Biradar, B. S. *J. Chem. Edu.* (1994), 71(5), 438-40.

An alternative analogy for the dissociation of oxyhemoglobin. Rao, T. S.; Dabke, R. B.; Patil, D. B. *J. Chem. Edu.* (1992), 69(10), 793.

Study of rapid reactions by the steady state principle: kinetics of the reaction between vitamin C and iodine in aqueous solution. Rao, T. S.; Murhe, M. M.; Dabke, R. B.; Harikrishna, T. *Current Science* (1990), 59(7), 370-2.

Presentations at Professional Meetings:

- Presented a paper "Chemistry classroom and laboratory learning modules for visually impaired high school and undergraduate students" at ICCE 2024, Pattaya, Thailand (July 15, 2024)
- Presented a paper "Development of chemistry classroom and laboratory learning modules for blind and visually impaired high school and undergraduate students" at the SERMACS 2023 Durham, NC (Oct 27, 2023)
- Presented a paper "Undergraduate acid-base titration experiment using an electrolysis cell" at ACS Fall Meeting in Atlanta, GA (August 24, 2021)
- Presented a paper "Enhancing Undergraduate Chemistry Laboratory Experience in the Area of General, Physical, and Analytical Chemistry" at Columbus State University Faculty Research Conference, CSU Campus, Columbus, GA (November 6, 2019)
- Presented a paper "Determining the quantity of acetic acid in household vinegar: Undergraduate laboratory titration experiment using three independent monitoring techniques" at SERMACS, Savannah, GA (October 20, 2019)
- Presented a paper "Developing Undergraduate Laboratory Curriculum in the Area of Electrochemistry" at the 'International Conference on Chemical Education (i.e., ICCE 2018)' at the University of Sydney, Sydney, Australia (July 11, 2018).
- Presented a paper "Enhancing Hand-on Learning Experience in an Undergraduate Chemistry Classroom and Laboratory" at the 'Middle Georgia ACS local section seminar' at Middle Georgia State University, Macon, GA (April 25, 2018: *Invited talk*).

- Presented a paper "Development of Undergraduate Laboratory Experiments in the Area of Electrochemistry" at ChemEd 2017 at South Dakota State University, Brookings, SD (July 2017).
- Presented a paper "Developing Hands-on learning modules for blind and visually impaired high school and undergraduate chemistry students" at ACS 2017 Spring meeting at San Francisco, CA (April, 2017).
- Presented a paper "Hands-on learning modules for blind and visually impaired chemistry students" at BCCE 2016 at the University of Northern Colorado, Greeley, CO (July 31-August 3, 2016).
- Rite of Passage Presentation: Columbus State University, Columbus, GA (October 8, 2015).
- Presented a paper "Electrolytic Reactions of Reagent Precursors for Preparation and Standardization of Commonly Used Reagents in an Undergraduate Laboratory" at ACS 2015 Spring meeting at Denver, CO (March, 2015).
- Presented a paper "Exploring the products of electrolysis: An undergraduate laboratory experiment" at BCCE 2014 at the Grand Valley State University, Allendale, Michigan (August, 2014).
- Presented a paper "Improving Hands-on Experience in an Undergraduate Chemistry Laboratory" at the Department of Chemistry, Indian Institute of Technology, Mumbai (formerly Bombay), India (July, 2014: *Invited talk*)
- Presented a paper "Combining Chemistry with Art: Employing Acid-Base Indicators to Illustrate the Electrolysis of Water" at ChemEd 2013 at the University of Waterloo, Waterloo, Canada (August, 2013).
- Presented a paper "Electrolysis of Water: A Demonstration for Middle, High School, and First Year Undergraduate Students" at 245th **ACS** National Meeting, Spring 2013, New Orleans, (April, 2013).
- Presented a paper "Electrolytic Chemical Reactions: Demonstrations for High School and Undergraduate Chemistry Laboratory" at BCCE 2012 (Biennial Conference on Chemical Education), Pennsylvania State University, University Park, PA (July-August, 2012)
- Presented a paper "Using Mole Ratios of Electrolytic Products of Water: A Modified Coulometric Analysis Experiment in the Undergraduate Laboratory" at 243rd **ACS** National Meeting, Spring 2012, San Diego, CA (March, 2012).
- Presented a paper "Development of Undergraduate Curriculum in the Area of Experimental Physical Chemistry" at the Math and Science Learning Center, Columbus State University, Columbus, GA 31907 (February, 2012).
- Presented a paper "Development of Electrochemistry Experiments for Undergraduate Students" at the Department of Earth and Space Sciences at the Fall Seminar Series, Columbus State University, Columbus, GA 31907 (November, 2011).
- Presented a paper "Experiment on the coulometric analysis in the undergraduate laboratory" at 242nd **ACS** National Meeting, Denver, CO (August-September, 2011).
- Presented a paper "Chemistry for Visually Impaired Community: Developing Periodic Table of Elements Using Touch Screen Tablet PC" at the **ACS** National Meeting, San Francisco, CA (March, 2010).
- Presented a paper "Improving Electrochemistry Experience in High School and Undergraduate Laboratories" at SERMACS, San Juan, Puerto Rico (October, 2009).

- Presented a paper "American Chemical Society's Requirements for the Bachelor's Chemistry Program Approval" as a Department of Chemistry Seminar (Columbus State University) (October, 2009).
- Presented a paper on "Performing Demonstrations and Improving 'Hands-on' Chemistry Experience of High School Students". The presentation was sponsored by COLS- STEM mini-grant project (Math Science Learning Center, Columbus State University, May, 2009).

Outreach, Committees, and Service:

Since 2002, I have been serving on various committees including ACS General Chemistry Exams Committee, University, College, and Department committees. I have been participating various outreach and recruitment activities such as STEM summer camps, Regional Science Olympiads events, National Chemistry Week Demos, and workshops for high school teachers. For several years I participated as a "Future Teachers Academy" instructor for high school students. For a past several years, I participated in outreach activities for blind and visually impaired high school and undergraduate students.

Summarized Professional Accomplishments:

- *Publications:* In affiliation with the Columbus State University, I published over twenty peer reviewed research articles in international scientific journals. These publications connect the content areas of physical chemistry and chemical education and focus on enhancing undergraduate classroom and laboratory experience.

- *Conference Presentations:* In the past several years, I have given over twenty research talks at local, regional, and two international conferences. This also includes invited talks.

- *Manuscript Reviews:* I reviewed over 55 manuscripts for various scientific journals in past several years. I have reviewed textbook chapters (about 30) in general chemistry and physical chemistry subject areas.

- *Media Coverage:* Students' research projects supervised by me were recognized by the local newspaper *Ledger Enquirer* (May 3, 2019), news portals *Cool Blind Tech, Inc.* (April 9, 2019), and *Noodls: Gateway to Facts* (March 28, 2016). The projects were based on developing chemistry learning modules for visually impaired students. Students had an opportunity to present this work to the 'Georgia InVenture' team at the Georgia Public Broadcasting studios in Atlanta, GA (March 2019).

- Undergraduate student Candice Tate who worked under my mentorship, received a national level '*Goldwater honorable mention*' in 2017 for her project on developing 3D printed learning modules for the visually impaired students.

- Recognitions, awards, and Grants: I was nominated for the '*Educator of the Year*' award by the students at Columbus State University in 2012, I received Faculty Center Fellowship Award (Fall 2013), and I received over $40,000 funds for the laboratory curriculum development over the past several years.