C. Patrick Collier Senior R&D Staff

Center for Nanophase Materials Sciences (865) 719-7137

Oak Ridge National Laboratory (865) 574-1753 FAX

1 Bethel Valley Rd., Oak Ridge, TN 37831-6493 [colliercp@ornl.gov](mailto:colliercp@ornl.gov)

<https://orcid.org/0000-0002-8198-793X>

**Education:**

Oberlin College, B.A., B. Mus 1991 Chemistry

University of California-Berkeley, Ph.D. 1998 Physical Chemistry

**Professional Experience:**

2015-present Senior Research Staff, Center for Nanophase Materials Sciences, ORNL

2014-present Joint Faculty Research Associate Professor, Bredesen Center, University of Tennessee, Knoxville

2008–2015Research Staff, Center for Nanophase Materials Sciences, ORNL

2001–2008 Assistant Professor, California Institute of Technology

1999–2001 Joint Hewlett-Packard – UCLA Postdoctoral Researcher

1998–1999 Postdoctoral Researcher, Dept. of Chem. and Biochemistry, UCLA

1991–1998 Graduate Research Associate, Dept. Chem., UC Berkeley

1990–1991 Undergrad. Research Assoc., Dept. Chem., Oberlin College

1990 NSF Undergrad. Research Fellow, Dept. Chem. Univ. of Utah

1989 NSF Undergrad. Research Fellow, Dept. Chem. Washington Univ. in St. Louis

**Professional Activities, Honors and Awards:**

Co-chair, organizing committee for ACS Fall 2023 Meeting Colloids Program Focus Session on Biomaterials and Biointerfaces

Co-chair, organizing committee for ACS Spring 2023 Meeting Colloids Program Focus Session on Controlled Assembly of Charged Soft Matter and Biomaterials and Biointerfaces

Co-chair, organizing committee for APS Spring 2021, 2022 Meetings Division of Polymer Physics (DPOLY) Focus Session on Charged Polymers for Neuromorphic Applications

Discussion leader for “Designing Structured Surfaces for Maximum Heat Transfer,” Gordon Research Conference on Micro & Nanoscale Phase Change Heat Transfer, 2017

Co-chair for CNMS Nano-Bio Conference, ORNL, 2013

Co-chair for “Micro and Nanotechnology; Nanopores” platform, Biophysical Society Meeting, 2011

Co-chair for “Molecular Electronic Circuit Assembly” track, Conference on Foundations of Nanoscience (DARPA), 2005-2007

Discussion leader for “Biomolecular and Supramolecular Electronics,” Gordon Research Conference on the Chemistry of Electronic Materials, 2005

Young Faculty Research Initiation Award, Center for Science and Engineering of Materials (NSF MRSEC) 2004

Research Innovation Award, Research Corp., 2002

Caltech President’s Fund Award, 2002

**Professional Memberships:**

American Chemical Society, American Physical Society, Biophysical Society, Materials Research Society

**Selected Peer-Reviewed Publications** (Total > 110, Web of Science h-index 39):

1. H.L. Scott, D. Bolmatov, U.I. Premadasa, B. Doughty, J.-M.Y. Carrillo, R.L. Sacci, M. Lavrentovich, J. Katsaras, C.P. Collier, “Cations Control Lipid Bilayer Membrane Memcapacitance Associated with Long-Term Potentiation”, *ACS Appl. Mater. Interfaces* (in press, 08/31/23).
2. W.T. McClintic, H.L. Scott, N. Moore, M. Farahat, M. Maxwell, C.D. Schuman, D. Bolmatov, F.N. Barrera, J. Katsaras, C.P. Collier, “Heterosynaptic Plasticity in Biomembrane Memristors Controlled by pH”, *MRS Bull.* (invited)**47**, 1 (2023).
3. H.L. Scott, D. Bolmatov, P.T. Podar, Z. Liu, J.J. Kinnun, B. Doughty, R. Lydic, R.L. Sacci, C.P. Collier, J. Katsaras, “Evidence for Long-Term Potentiation in Lipid Membranes”, *Proc. Natl. Acad. Sci. U.S.A.*, **119**, e2212195119 (2022).
4. R.L. Sacci, H. Scott, Z. Liu, D. Bolmatov, B. Doughty, J. Katsaras, C.P. Collier, “Disentangling Memristive and Memcapacitive Effects in Droplet Interface Bilayers Using Dynamic Impedance Spectroscopy”, *Adv. Electron. Mater.* **2200121** (2022).
5. Z. Liu, L. Lin, T. Li, J. Kinnun, K. Hong, Y.-Z. Ma, R.L. Sacci, J. Katsaras, J.-M. Carrillo, B. Doughty, C.P. Collier, “Squeezing Out Interfacial Solvation: The Role of Hydrogen-Bonding in the Structural and Orientational Freedom of Molecular Self-Assembly”, *J. Phys. Chem. Lett.* **13**, 2273−2280 (2022).
6. L. Lin, A.U. Chowdhury, Y.-Z. Ma, R.L. Sacci, J. Katsaras, K. Hong, C.P. Collier, J.-M.Y. Carrillo, B. Doughty, “Ion Pairing Mediates Molecular Organization Across Liquid/Liquid Interfaces”, *ACS Appl. Mater. Interfaces* **13**, 33734-33743 (2021).
7. W.T. McClintic, G.J. Taylor, M.L. Simpson, C.P. Collier, “Macromolecular Crowding Affects Voltage-Dependent Alamethicin Pore Formation in Lipid Bilayer Membranes”, *J. Phys. Chem. B* **124**, 5095 (2020).
8. W. Shi, J.R. Vietez, A.S. Berrier, M.W. Roseveare, D.A. Surinach, B.R. Srijanto, C.P. Collier, J.B. Boreyko, “Self-Stabilizing Transpiration in Synthetic Leaves”, *ACS Appl. Mater. Inter.* **11**, 13768-13776 (2019).
9. J.S. Najem, M.S. Hasan, R.S. Williams, R.J. Weiss, G.S. Rose, G.J. Taylor, S.A. Sarles, C.P. Collier, “Dynamical Nonlinear Memory Capacitance in Biomimetic Membranes”, *Nat. Commun.* **10**, 3239 (2019).
10. J.S. Najem, G.J. Taylor, R.J. Weiss, M.S. Hasan, G. Rose, C.D. Schuman, A. Belianinov, C.P. Collier, S.A. Sarles, “Memristive Ion Channel-Doped Biomembranes as Synaptic Mimics”, *ACS Nano* **12**, 4702-4711 (2018).

**Collaborators:**

Stan Williams, Texas A&M University

Eric Freeman, University of Georgia

Drew Marquardt, University of Windsor

Sergei Sukharev, University of Maryland

Chuan-Hua Chen, Duke University

Konstantinos Giapis, California Institute of Technology

William Goddard III, California Institute of Technology

Chris Richards, University of Kentucky

Yuegang Zhang, Tsinghua University

Jonathan Boreyko, Virginia Tech

Jiangtao Cheng, Virginia Tech

Steve Abel, University of Tennessee, Knoxville

Andy Sarles, University of Tennessee, Knoxville

Garrett Rose, University of Tennessee, Knoxville

Doug Hayes, University of Tennessee, Knoxville

Francisco Barrera, University of Tennessee, Knoxville

Fred Heberle, University of Tennessee, Knoxville

Catherine Schuman, University of Tennessee, Knoxville

Benjamin Doughty, ORNL

Kashif Nawaz, ORNL

Scott Retterer, ORNL

Nickolay Lavrik, ORNL

John Katsaras, Schull-Wollan Center, ORNL-UT

**Graduate and Postdoc Advisors:**

Graduate Advisor: Richard Saykally (UC-Berkeley)

Postdoctoral Advisor: James Heath (UCLA)

**Thesis Advisor and Postgraduate-Scholars Sponsor**

Total Graduate Students Advised: 14

Rajan Kulkarni (California Institute of Technology, PhD)

Garrett Bittner (California Institute of Technology, MS)

Yoshie Narui (California Institute of Technology, MS)

Ian Shapiro, (California Institute of Technology, PhD)

Yu Liu, (California Institute of Technology, PhD)

Jason Gamba (California Institute of Technology, PhD)

Prachya Mruetusatorn (Univ. Tennessee-Knoxville, MS)

Charles Chin (Univ. Tennessee-Knoxville, PhD)

Liz Norred (Univ. Tennessee-Knoxville, PhD)

Patrick Caveney (Univ. Tennessee-Knoxville, PhD)

Guru Venkatesan (Univ. Tennessee-Knoxville, PhD)

Mary-Anne Nguyen (Univ. Tennessee-Knoxville, PhD)

William McClintic (Univ. Tennessee-Knoxville, PhD)

Elijah Charles (Univ. Tennessee-Knoxville, PhD)

Total Postdoctoral Scholars Advised: 12 (\*denotes current)

Hyungil Jung (Yonsei University)

Seung-Yong Jung (Sciex-Intabio)

Maria Esplandiu (Universitat Autonoma de Barcelona)

Donato Ceres (Aquamox, Inc.)

Jinyu Chen (Henkel Corp.)

Elizabeth Vargis (Utah State University)

Jonathan Boreyko (Virginia Tech)

Fangjie Liu (Uber Eats)

Graham Taylor (Helix Biotech)

Joseph Najem (Penn State University)

Zening Liu (Moleaer)

Haden Scott (Helix Biotech)