Physical Chemistry Research at Undergraduate Institutions: Innovative and Impactful Approaches, Volume 2



Library of Congress Cataloging-in-Publication Data

Names: Hopkins, Todd A., editor. | Parish, Carol A., editor.

Title: Physical chemistry research at undergraduate institutions:

innovative and impactful approaches. Volume 2 / Todd A. Hopkins, editor, Butler

University, Indianapolis, Indiana, United States. Carol A. Parish, editor,

University of Richmond, Richmond, Virginia, United States,

Description: Washington, DC: American Chemical Society, [2022] | Series:

ACS symposium series; 1429 | Includes bibliographical references and

index. | Summary: "This book is about Physical Chemistry Research at

Undergraduate Institutions: Innovative and Impactful Approaches"--

Provided by publisher.

Identifiers: LCCN 2022050421 (print) | LCCN 2022050422 (ebook) | ISBN

9780841297418 (hardcover OP) | ISBN 9780841297401 (ebook) | ISBN 9781713888369 (pod)

Subjects: LCSH: Chemistry, Physical and theoretical--Study and teaching

(Higher) | Chemistry, Physical and theoretical--Research. | Chemistry,

Physical and theoretical--Miscellanea.

Classification: LCC QD455.5 .P497 2022 (print) | LCC QD455.5 (ebook) |

DDC 541.072--dc23/eng20230117

LC record available at https://lccn.loc.gov/2022050421

LC ebook record available at https://lccn.loc.gov/2022050422

The paper used in this publication meets the minimum requirements of American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials, ANSI Z39.48n1984.

Copyright © 2022 American Chemical Society

All Rights Reserved. Reprographic copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Act is allowed for internal use only, provided that a per-chapter fee of \$40.25 plus \$0.75 per page is paid to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA. Republication or reproduction for sale of pages in this book is permitted only under license from ACS. Direct these and other permission requests to ACS Copyright Office, Publications Division, 1155 16th Street, N.W., Washington, DC 20036.

The citation of trade names and/or names of manufacturers in this publication is not to be construed as an endorsement or as approval by ACS of the commercial products or services referenced herein; nor should the mere reference herein to any drawing, specification, chemical process, or other data be regarded as a license or as a conveyance of any right or permission to the holder, reader, or any other person or corporation, to manufacture, reproduce, use, or sell any patented invention or copyrighted work that may in any way be related thereto. Registered names, trademarks, etc., used in this publication, even without specific indication thereof, are not to be considered unprotected by law.

PRINTED IN THE UNITED STATES OF AMERICA

Contents

Pre	eface	ix
1.	Physical Chemistry Research in the Shields Lab by Goldwater Scholars: Including Lessons Learned	1
2.	Photochemical and Photophysical Outcomes of Brown Carbon Chromophores: Insights from Laser Spectroscopy and Dynamics of Isolated Molecules and Complexes Nathanael M. Kidwell	31
3.	The Challenges and Joys of Moving Protons with Light and Undergraduates Kana Takematsu	49
4.	Developing an Undergraduate Research Laboratory for Experimental Physical Chemistry Laura R. McCunn and AnGayle (AJ) Vasiliou	63
5.	Chiral Light Emitting Materials using Deep Eutectic Solvents	73
6.	Thermal Analysis: Versatile Research Instruments for Physical Chemistry Research at a Primarily Undergraduate Institution Thomas DeVore, James Harness, Isatu Kamara, and Barbara Reisner	93
7.	Demystifying Imidazolium-Based Ionic Liquids on a Molecular Level with a C-D Infrared Probe	107
8.	Accessible and Efficient Modeling of Chromophores with Time-Independent Excited-State Density Functional Tight-Binding: Concepts and Applications Megan Y. Deshaye, Zoe A. Pollard, Alessandro Banducci, Alyssa Goodey, Chanath Prommin, Narissa Kanlayakan, Nawee Kungwan, and Tim Kowalczyk	
9.	Investigation of Protein-Protein Interactions Utilizing a Nano-Gold Colloid Surface Plasmon Resonance: Application to SARS CoV-2 Spike Protein Coated Gold Colloids	145

10. Building Blocks: Investigating the Structures, Properties, and Reactivity of Strongly		
Bound Atomic Clusters at a PUI	165	
Jonathan T. Lyon		
Editors' Biographies		
Indexes		
Author Index	185	
Subject Index	187	