



# MINNECEUTICS

Indispensable News.

University of Minnesota Department of Pharmaceutics

## Awards & Achievements

p. 15-16

Highlighting student and faculty  
success in 2021-2022.

## GPEN 2022 Announcement

p. 12

The University of Minnesota Twin  
Cities campus will be this year's  
host!

## 6<sup>th</sup> David Grant Symposium

p. 10

The 6<sup>th</sup> DGS will make a return to  
campus next year!

2022 Issue



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# A Message to Our Friends

Dear friends,

Life has many seasons. Arguably, the last two years could be depicted as a long Minnesota winter. However, when I look about campus I can't help but think of spring. Courtyards and classrooms are bustling with students, labs are percolating with research, and people are flocking to meetings worldwide to reunite with their peers. While some caution remains, it is clear that we are back.

I am thrilled to announce that our department will host the 13th biennial Globalization of Pharmaceutics Education Network (GPEN) conference. Our students have worked tirelessly to make the experience uplifting after such a long time apart and I am confident our guests will enjoy the sessions, short courses, and activities that the committee has organized.

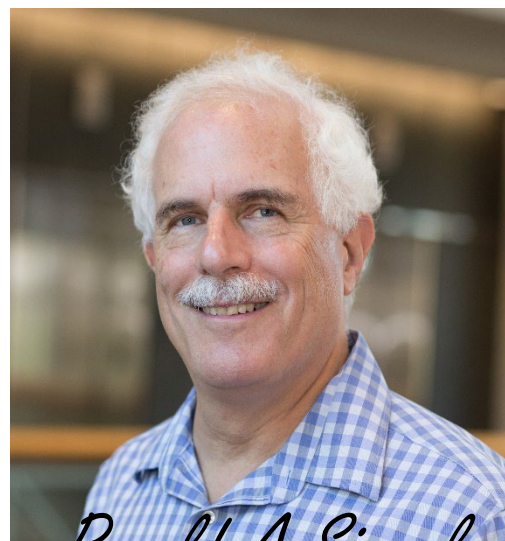
I am also pleased to announce our AAPS/PharmSci 360 Alumni reception, which will take place on Monday, October 17 from 5:30-6:30pm. We hope the new time slot, which replaces the breakfast, will allow more of our alumni to participate. We are eager to see you again. I also want to thank those who participated in our second online alumni meeting last December. We are always interested to hear how our alumni are faring in the field.

Equally deserving of praise was the successful return in June of the Gordon Research Conference: Barriers of the CNS, chaired by Dr. Bill Elmquist, which brought together a multidisciplinary international group of scientists and clinicians to promote brainstorming and novel collaborations surrounding brain barriers in health and disease. We also anticipate strong turnout for the in-person 6th David Grant Symposium scheduled for next summer, chaired by Dr. Calvin Sun.

At the departmental level, students have returned to walking at commencement in greater numbers, delivering public seminars face-to-face, and conducting collaborative experiments on campus.

Lastly, our department Fall picnic was restored after a three year hiatus. We were gifted perfect weather to play, eat, and rejoice in each other's company on the East River flats. (To see photos, please go to page 19-20).

In closing, I welcome your feedback on any departmental activity and look forward to the coming and future professional meetings where we can smile and shake hands again!



*Ronald A. Siegel*  
Department Head





# Meet Our Faculty



**William F. Elmquist, PharmD, PhD**  
Distinguished Professor, Pharmaceutics  
Director, Brain Barriers Research Center



**Carolyn A. Fairbanks, PhD**  
Professor, Pharmaceutics  
Associate Dean for Research and  
Graduate Education, College of  
Pharmacy



**Karunya K. Kandimalla, PhD**  
Associate Professor and Associate Director of  
Graduate Studies, Pharmaceutics



**Hongbo Pang, PhD**  
Assistant Professor,  
Pharmaceutics



**Henning Schroeder, PhD**  
Director of International  
Programs, College of Pharmacy  
Professor, Pharmaceutics



**Ronald A. Siegel, ScD**  
Professor and Interim Department  
Head, Pharmaceutics



**Changquan Calvin Sun, PhD**  
Professor, Director of Graduate  
Studies, and Associate Department  
Head, Pharmaceutics



**Raj Suryanarayanan, PhD**  
Professor and Peters Endowed  
Chair, Pharmaceutics



**Timothy S. Wiedmann, PhD**  
Professor, Pharmaceutics

## Adjunct Faculty

**Richard C. Brundage, PharmD, PhD,**  
Experimental & Clinical Pharmacology, U of M

**Lester R. Drewes, PhD,** Biochemistry &  
Molecular Biology, U of M Duluth

**Virginia Ghafoor, PharmD,** Fairview Pharmacy  
Services

**Susan Krueger, PhD,** NIST Center for Neutron  
Research

**David A. Largaespada, PhD,** Genetics, Cell  
Biology & Development, U of M

**Jayanth Panyam, PhD,** Temple University

**Theresa M. Reineke, PhD, MS,** Chemistry, U of M

**Jann N. Sarkaria, MD,** Mayo Clinic

**Ronald J. Sawchuk, PhD,** Professor Emeritus

**Rachael Sirianni, PhD, MS, MSE,** University of  
Texas Health Science Center at Houston

**Robert Thorne, PhD,** Denali Therapeutics

**Chun Wang, PhD,** Biomedical Engineering,  
U of M

**Joseph A. Zasadzinski, PhD,** Chemical  
Engineering & Materials Science, U of M

**Cheryl L. Zimmerman, RPh, PhD,** Professor  
Emeritus



## Degrees Earned in 2021-2022



*Congratulations*  
to all our graduates

### Benjamin Clements, PhD

Advisor: Professor Carolyn Fairbanks  
Thesis: *Pharmacokinetics and Pharmacodynamics of Strategically Substituted Agmatines*



### Jessica Griffith, PhD

Advisor: Professor William Elmquist  
Thesis: *Central Nervous System Delivery and Pharmacokinetics of Novel Therapeutics: Implications for Small Molecules and Antibody-Drug Conjugates*



### Jayesh Sonje, PhD

Advisors: Professor Raj Suryanarayanan  
Thesis: *Excipient Phase Transformation in Frozen and Freeze-Dried Formulations and Their Impact on Protein Stability*



### Andrew Zhou, PhD

Advisor: Professor Karunya Kandimalla  
Thesis: *Protein Trafficking and Signaling Deficits at the Blood-Brain Barrier in Preclinical Models of Alzheimer's Disease and Metabolic Syndrome*



### Ishaan Duggal, MS

Advisor: Professor Ronald Siegel  
Thesis: *Temperature and Water Responsive Shape Memory Polymers for Soft Tissue Expansion*



### Sanjana Nair, MS

Advisor: Professor Karunya Kandimalla  
Thesis: *Determining the Effect of Lipid Nanoemulsions on Insulin Signaling and the Inflammatory Pathways at the Blood-Brain Barrier*



### Surabhi Talele, PhD

Advisor: Professor William Elmquist  
Thesis: *Distribution of DNA Damage Response Inhibitors to the Central Nervous System for Brain Tumor Therapy*





# Commencement



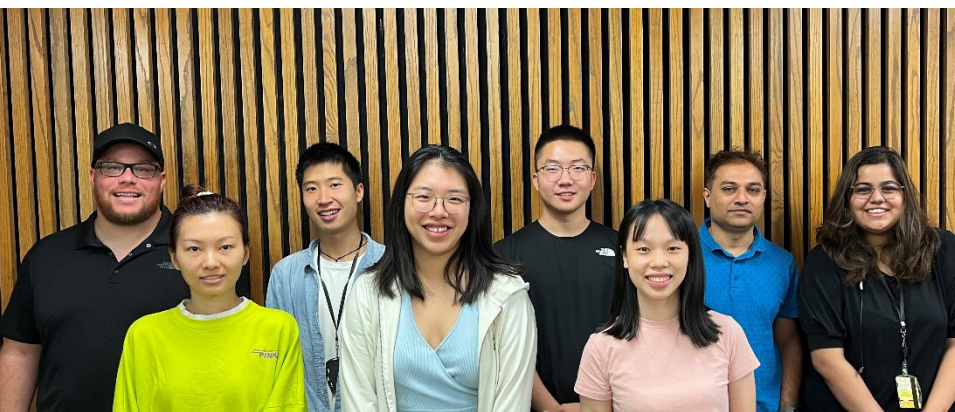
*Congratulations*  
to the class of 2022



Pictured graduates: Andrew Zhou, Benjamin Clements, Jayesh Sonje, Jessica Griffith, Krutika Jain, and Surabhi Talele.







# Welcome New Students!



## Jo Calihan

*MS program*

Advisor: Kandimalla  
BS in Cell &  
Molecular Biology,  
Texas Tech University



## Pin-Syuan Huang

*MS program*

Advisor: Sun  
BS in Pharmacy, Taipei  
Medical College



## Riddhi Kini

*MS program*

Advisor: C. Wang  
BPharm in  
Pharmaceutics, Oriental  
College of Pharmacy



## Lina Le

*PhD program*

Advisor: Elmquist  
BS in Chemistry,  
Biochemistry Track,  
University of North  
Carolina at Chapel Hill



## Yiqin Li

*PhD program*

Advisor: Pang  
BS in Pharmacology and  
Toxicology, Pennsylvania  
State University



## Dhavalkumar Mori

*PhD program*

Advisor: Sun  
MPharm in Pharmaceutical  
Biotechnology, Saurashtra  
University &  
BPharm, Shree B.M.Shah  
College of Pharmaceutical  
Education and Research



## Chaowang Zheng

*MS program*

Advisor: Kandimalla  
BS in Pharmaceutical  
Engineering, Shenyang  
Pharmaceutical  
University

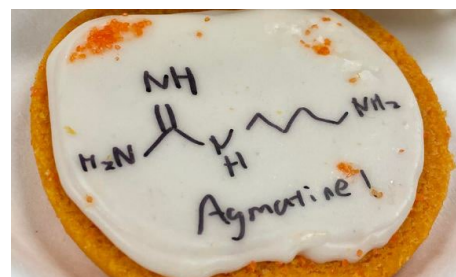
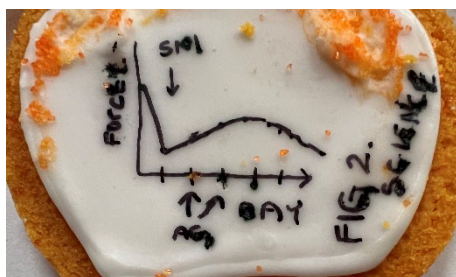


## Yuping Zhou

*PhD program*

Advisor: Sun  
MS in Pharmaceutics & BEng  
in Pharmaceutical Engineering,  
Wuhan Institute of Technology

We look forward  
to all the creative  
solutions you will  
discover on your  
journey!



Cookie designs by Tongzhen Xie



# Farewell Dear Friends



## Ken Miller

Our friend Kenneth W. Miller passed away on September 19, 2022 due to ALS. Ken is survived by his wife Shelly, brother Fred, son Keith, and daughter Shelley, among others.

Ken was a Pharmaceutics faculty member from 1971 until 1982. He worked alongside Professors Robin Enever and Susan C. Miller and his laboratory staff Lorrie Ransome and Melissa Stock. He also helped guide graduate students Richard J. Hunt, Keith Chan, and Tom Johnson, among others.

Dr. David Newton from the Albany College of Pharmacy and Health Services, where Ken was a Dean for a decade said, "Ken should be remembered for his nearly always grinning smile; words to bring happiness, levity, encouragement and stress reduction to others; and unique wit and even demeanor to meet challenges and crises and solve peoples' problems both small and large." For more about his passing, please visit:

<https://www.dignitymemorial.com/obituaries/alexandria-va/kenneth-miller-10935572>



## Ed Rippie

Our friend Edward Grant Rippie passed away on March 22, 2022. Ed is survived by his wife, Dorothy Ruth Tegtmeier and his son, Edward Glenn Rippie.

Ed had a long career with the University of Minnesota, joining as an Assistant Professor in 1959 and retiring as 1996. During his time in Pharmaceutics, he served as both the Director of Graduate Studies and as Department Head.

He was described by past students as supportive, compassionate, and willing to put in countless hours to help students succeed. His generosity and name live on in the Edward G. Rippie Fellowship that our Pharmaceutics students have received. We thank him and will miss him greatly.

For more about his passing, please visit:  
[https://prabook.com/web/edward\\_grant\\_rippie/68088](https://prabook.com/web/edward_grant_rippie/68088)





YOU'RE INVITED

# MINNESOTA ALUMNI RECEPTION

MONDAY, OCTOBER 17, 2022

5:30 TO 6:30 PM

THE WESTIN BOSTON SEAPORT DISTRICT  
DOUGLASS ROOM

AAPS PharmSci 360

Boston, Massachusetts | October 16-19, 2022

Please note that AAPS PharmSci 360 registration is NOT required to attend this reception.  
If you have any questions about the reception, please contact Katie: [kmjames@umn.edu](mailto:kmjames@umn.edu)

**AAPS Student Chapter board members for 2022-2023:**

*Chair Elect:* Jo Calihan

*Secretary:* Jigar Paras Sethiya

*Web-coordinator/ Social Media Advertiser:* Jiayan Le

*Treasurer:* Zijian Wang

*Student Outreach Officer:* Vaishnavi Veerareddy

[pharmacy.umn.edu/departments/pharmaceutics](https://pharmacy.umn.edu/departments/pharmaceutics)



# 6th David Grant Symposium

*Curious about the upcoming meeting?*



**The exact date is still being selected, but we can confirm that the symposium will return to the University of Minnesota campus in summer 2023!**

## **New to the symposium?**

The symposium covers a variety of topics including crystallization of pharmaceuticals, structure-properties of pharmaceuticals, amorphous pharmaceuticals and dissolution, and trends in solids development.

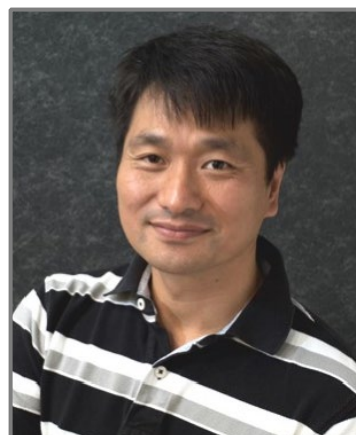
The symposium is held in honor of the late David Grant, a Professor and William and Mildred Peters Endowed Chair. Grant was globally recognized for his expertise and contributions in several areas, most notably in the field of pharmaceutical materials science. His research enabled pharmaceutical companies to make safe and effective drug products with reproducible and predictable performance.

“We are very proud that, in just a few short years, the David Grant Symposium has become the premier conference for solid-state pharmaceuticals,” said Professor Changquan Calvin Sun, the conference’s program chair.

## **Travel hesitant? Let us know!**

We may add a virtual component if there is sufficient demand.

We were thrilled to have nearly 180 participants joining us worldwide in 2021 and can’t wait to see you all again in person!



[sunx0053@umn.edu](mailto:sunx0053@umn.edu)  
612-624-3722





# First National Postdoctoral Appreciation Week

Dear postdoctoral fellows, faculty and staff,

Thank you so much for attending our first luncheon in honor of National Postdoctoral Appreciation Week. Regrettably, our plans for last year's luncheon fell through due to the pandemic, but I will say this year's celebration was wonderful. A special thanks to Dr. Carolyn Fairbanks, associate dean for research and graduate education, Karla Eggen, Katie James, and Oanh Nguyen for coordinating the festivities.

I especially want to reiterate that postdoctoral fellows are critical members of our College of Pharmacy community, pushing science forward while often simultaneously helping to mentor graduate and undergraduate students. Throughout their postdoctoral training, they are also learning and developing skills that will shape their future professional careers. It was great to hear from each of the postdoctoral fellows about their focus area but also more personally in terms of their point of pride.

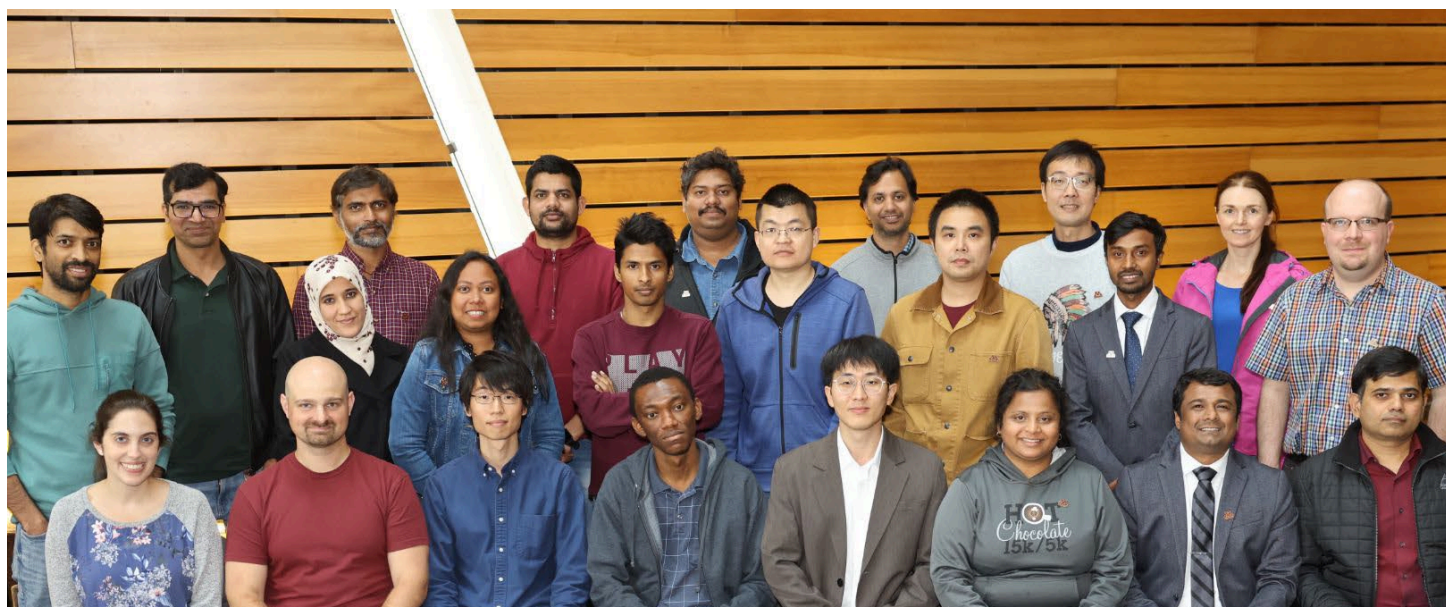
These types of events are important because they celebrate the valuable contributions of these individuals. Equally important, this event fostered greater connections with members of our community.

I hope you enjoyed the time together. Thank you so much for attending and for all that you do to make the College of Pharmacy a special place.

Sincerely,



Lynda S. Welage, Pharm.D., FCCP  
Dean and Professor  
College of Pharmacy  
University of Minnesota



## The wait is over!

The Globalization of Pharmaceuticals Education Network (GPEN) Executive Committee and the Department of Pharmaceuticals at the University of Minnesota-Twin Cities are pleased to announce the 13th biennial GPEN conference in Minneapolis, Minnesota.

*GPEN2022 is honored to welcome over 200 participants from over 48 universities and 25 industrial observers. After two years of necessary postponement, we are eager to meet all of you and wholeheartedly welcome you from around the world!*



As the conference draws closer, the GPEN2022 organizing committee is getting more excited to share all that they have planned with you! The GPEN2022 meeting will provide career-networking opportunities; connecting senior pharmaceutical students with industrial participants. The committee has also planned evening events in both Minneapolis and St. Paul to give our guests a flavor of the lovely Twin Cities. Our hosts hope you look forward to four days of rigorous education, science, and networking and sincerely hope all participants will have a pleasant and fruitful meeting.

Tongzhen and Wenjuan would like to thank their colleagues in the Pharmaceuticals Department, especially the students in GPEN sub-committees, for their immense help in organizing the event. Additionally, they would like to express gratitude to the GPEN board, the organizing committee, and the Pharmaceuticals Department as well as the College of Pharmacy for the generous sponsorships. They have expressed that the event would not be possible without such organizational and financial support.

**Faculty co-chairs:** Drs. William Elmquist & Dr. Raj Suryanarayanan.

**Original Student co-chairs:** Surabhi Talele & Andrew Zhou paved the start of the conference pre-COVID19.

**Current Student co-chairs:** Wenjuan Zhang & Tongzhen Xie gradually took on responsibilities after the GPEN board decided to postpone it to October 2022.

For more information, please visit: <https://gpenconference.com/>





# 2022-2023 Fellowships & Grants



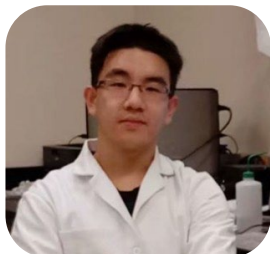
## **Awardee: Benjamin Clements**

Advisor: Dr. Carolyn Fairbanks

### **Dr. Christopher N. Honda**

#### **Graduate Student Fellowship**

*This fellowship is administered by the Graduate Program in Neuroscience.*



## **Awardee: Jinghan Li**

Advisor: Dr. Raj Suryanarayanan

### **Edward G. Rippie Fellowship**

*This fellowship is awarded to students with a consistent and outstanding academic record in Pharmaceutics.*



## **Awardee: Yuexuan Li**

Advisor: Dr. Hongbo Pang

### **Edward G. Rippie Fellowship**

*This fellowship is awarded to students with a consistent and outstanding academic record in Pharmaceutics.*



## **Awardee: Vrishali Salian**

Advisor: Dr. Karunya Kandimalla

### **Rory P. Remmel & Cheryl L. Zimmerman Fellowship**

*This fellowship is awarded to students that have chosen a thesis advisor whose research encompasses Drug Metabolism or Pharmacokinetics.*



## **Awardee: Gerrit Vreeman**

Advisor: Dr. Calvin Sun

### **Ted Rowell Graduate Fellowship**

*The Ted Rowell Graduate Fellowships are awarded to full-time College of Pharmacy PhD graduate students who are conducting research in basic pharmaceutical sciences with an emphasis in nutrition or drug delivery systems.*

### **David J.W. Grant & Marilyn J. Grant Fellowship in Physical Pharmacy**

*This fellowship is awarded to students whose research is focused in Physical Pharmacy.*

### **Dr. Paul B. Myrdal Memorial Fellowship**

*This fellowship is awarded by the American Foundation for Pharmaceutical Education to "high performing students who possess the skill and aptitude to become outstanding scientists and leaders in the pharmaceutical industry, academia, and the government/nonprofit sectors."*



# 2022-2023 Fellowships & Grants



## Awardee: Zengtao Wang

Advisor: Dr. Karunya Kandimalla

### Ronald Sawchuk Fellowship

*This fellowship is awarded to a graduate student whose research is focused in Pharmacokinetics.*

### UMII-MnDRIVE Research Assistantship

*The University of Minnesota Informatics Institute MnDRIVE Graduate Assistantship program supports UMN PhD candidates pursuing research at the intersection of informatics and one of five other approved areas.*

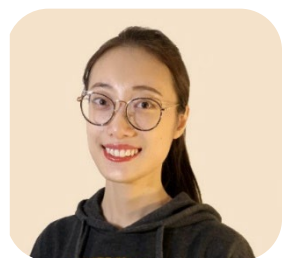


## Awardee: Tongzhen Xie

Advisor: Dr. Carolyn Fairbanks

### Dr. Christopher N. Honda Graduate Student Fellowship

*This fellowship is administered by the Graduate Program in Neuroscience.*



## Awardee: Wenjuan Zhang

Advisor: Dr. William Elmquist

### Bighley Graduate Fellowship

*The Bighley Graduate Fellowships are awarded to full-time College of Pharmacy PhD graduate students who have great potential and are conducting research in basic and applied pharmaceutical sciences.*

### Rory P. Remmel & Cheryl L. Zimmerman Fellowship

*This fellowship is awarded to students that have chosen a thesis advisor whose research encompasses Drug Metabolism or Pharmacokinetics.*





# Awards & Achievements

## Highlighting Success in 2021-2022



### **Benjamin Clements** (*graduate student*)

#### **Fall 2021 Outstanding TA Award**

This award recognizes outstanding performance of teaching assistants in the College of Pharmacy's PharmD program.



### **Vrishali Salian** (*graduate student*)

#### **Merck-sponsored AAPS Travelship**

Awarded to support Vrishali's attendance to the AAPS/PharmSci 360 meeting in Boston, MA.



### **Vikram Joshi** (*graduate student*)

#### **Fall 2021 & Spring 2022 Outstanding TA Award**

This award recognizes outstanding performance of teaching assistants in the College of Pharmacy's PharmD program.

#### **2022 Best AAPS Abstract Award**

Awarded for her abstract titled, "The Mechanisms Governing the Positive Feedback Loop between Cerebrovascular Inflammation and Amyloid Beta Accumulation". It was selected as one of the top 10% of abstracts based on high ratings by AAPS Abstract Screening Committee.



### **Kelley Kitto** (*Researcher 5*)

#### **Research Technical Service Award**

This award recognizes staff for their distinguished service to the University of Minnesota research community and celebrates exemplary leadership that positively impacted their colleagues and advanced the University's mission. Each awardee is given a \$1k honorarium.



### **Sichen Song** (*graduate student*)

#### **IPEC Graduate Student Award**

Awarded at AAPS PharmSci 360 Conference held in Boston, MA. Granted by the International Pharmaceutical Excipient Council of the Americas Foundation (IPEC) for 2022. The scholarships focus on recent significant contributions to formulation science and technology through innovative research with excipients.



### **Jinghan Li** (*graduate student*)

#### **IPEC Graduate Student Award**

Awarded at AAPS PharmSci 360 Conference held in Boston, MA. Granted by the International Pharmaceutical Excipient Council of the Americas Foundation (IPEC) for 2022. The scholarships focus on recent significant contributions to formulation science and technology through innovative research with excipients.

#### **Best Poster Award**

Sichen won third place in the Medical Devices division of the the 2022 Institute for Engineering in Medicine (IEM) Annual Conference at UMN. His poster was titled, "Experiments, Modeling, and Simulations for a Gel Bonded to a Rigid Substrate" (Authors: Sichen Song, Ronald A. Siegel, Manuel A. Sánchez, M. Carme Calderer, and Duvan Henao).



### **Sneha Rathi** (*graduate student*)

#### **Fall 2021 Outstanding TA Award**

This award recognizes outstanding performance of teaching assistants in the College of Pharmacy's PharmD program.



### **Zengtao Wang** (*graduate student*)

#### **Fall 2021 Outstanding TA Award**

This award recognizes outstanding performance of teaching assistants in the College of Pharmacy's PharmD program.



# Awards & Achievements

## Highlighting Success in 2021-2022



### Dr. Karunya Kandimalla

#### New Grant

Awarded by the NIH National Institute of Neuro Disorders & Stroke, it's titled, "Amyloid beta peptides and type-2 diabetes sequelae synergistically inhibit insulin signaling and trafficking at the blood brain barrier."



### Dr. Raj Suryanarayanan

#### NIPTE Grant

Dr. Sury has been awarded a new \$2 million U01 federal grant titled, "Platform for reliable characterization and evaluation of comparability of biosimilar drug products in lyophilized and liquid formulations". The objective of this grant, awarded by the US Food and Drug Administration (FDA) to the National Institute for Pharmaceutical Science and Education (NIPTE), is to create an analytical platform allowing performing reliable analytical and functional characterization and evaluation of the comparability of biosimilar drug products. Dr. Sury will lead an international team of scientists from the University of Minnesota, the University of Iowa, and the Indian Institute of Technology in Delhi. Dr. Vadim J. Gurvich, Institute for Therapeutics Discovery and Development (ITDD), will be leading the coordination in his capacity as the executive director of NIPTE and participate as a co-investigator.



### Dr. Hongbo Pang

#### UMN ODAT Grant

The Office of Discovery and Translation awarded Dr. Pang with a grant that will be used for optimizing a peptide-drug conjugate to treat rheumatoid arthritis.



### Dr. Changquan Calvin Sun

#### David J. W. Grant NIPTE Distinguished Scholar Award in Basic Pharmaceutics

This award was established in 2018 to recognize outstanding scientific achievements in the relevant areas of pharmaceutical science and technology. It is the highest recognition awarded by the National Institute for Pharmaceutical Technology and Education (NIPTE). Awardees receive \$2k in cash and up to \$20k in research funds.

#### NSF Phase I IUCRC grant (5 years)

This grant was awarded for establishing the "Center for Integrated Material Science and Engineering for Pharmaceutical Products (CIMSEPP)." This center supports research selected by the center industry advisor board, currently consisting of 13 company members. Learn more about CIMSEPP at <https://www.cimsepp.org/>

#### 2021-2022 Teacher of the Semester (Spring)

Awarded by the class of 2025, this award is given to acknowledge all of the hard work faculty put into the semester to make the class thrive. Students vote on which faculty were truly an influential part of their learning.





# From the Director of Graduate Studies

Dear UMN Pharmaceutics family,

Leaving behind the disruption and destruction caused by COVID19, we started getting back into regular routines and moving towards the beauty and promise of life with renewed optimism and enthusiasm. As DGS, I experience these changes in the Pharmaceutics graduate program from a special vantage point. When I cheer for freshly minted graduates carrying the banners of scientific ingenuity, integrity, and academic prestige, I fold my hands in praise and appreciation of the contributions of our alumni and relentless efforts of faculty and staff. As I stand to welcome the new batch of talented graduate students, brimming with enthusiasm and immense potential for scientific inquiry and scholarship, I am confident that this beacon of excellence will ever be illuminated.

Our students continue to earn prestigious awards at collegiate and national levels and stand as outstanding examples of scholars and leaders-in-training. We learned from the 2021 gradSERU survey, conducted by the Graduate School, how much our students value their experience in the Pharmaceutics program. In the survey, students were also forthright about the difficulties they have been facing with rising costs of living and stress. As a department we have come together to address these concerns and implement changes. For example, we raised the stipends of Ph.D. students; this additional financial support is expected to not only to help our students focus on research without having major financial concerns, but also enhance our ability to attract top candidates to our graduate program. We really appreciate the honest and open communication we have with our students and strive to maintain the environment where their ideas are respected and their talents are embellished.

This year again we had a large number of exceptionally strong candidates apply to our program. We were fortunate to recruit four new PhD students and four MS students to join us this fall. We are also producing a series of short videos to showcase our research accomplishments and celebrate the many successes of our department and graduate program. This will allow prospective applicants to take a closer look at the outstanding program we have. We continued our summer research internship program this year, which is designed to introduce our program to undergraduate students and engage them early in their undergraduate careers.

I also would like to celebrate the contributions of our administrative staff, Katie James, Amanda Hokanson, and Jody Tracy, in coordinating operations for the regular functioning of the department. They handled several uncertainties that were posed by a post-pandemic environment and provided unwavering support to all our students. Ms. James handled graduate admissions under many changing regulations and restrictions facing students and managed to pull together a brilliant group of graduate students that we are very delighted to have in our program. Ms. James also conducted graduation ceremonies with flair, giving our graduates wonderful memories to cherish and share with their advisors, families, and friends. Through our joint efforts, we continue to be one of the best Pharmaceutics programs in the nation and world.

In closing, I welcome any feedback or suggestions you have on the program and look forward to what we will accomplish together.

Sincerely,



*Karunya  
Kandimalla, PhD*  
Director of Graduate  
Studies

[pharmacy.umn.edu/departments/pharmaceutics](https://pharmacy.umn.edu/departments/pharmaceutics)



# Graduate Student Organizations

## Elected 2022-2023

### AAPS UMN Student Chapter Officers



*Chair*  
**Chenxu Li**  
Experimental & Clinical  
Pharmacology



*Chair-Elect*  
**Jo Calihan**  
Pharmaceutics



*Treasurer*  
**Zijian Wang**  
Pharmaceutics



*Secretary*  
**Jigar Paras Sethiya**  
Medicinal Chemistry



*Web Coordinator*  
**Jiayan Le**  
Pharmaceutics



*Student Outreach*  
**Vaishnavi Veerareddy**  
Pharmaceutics

### Pharmaceutics Graduate Student Representatives



**Arushi Agarwal**  
Pharmaceutics



**Riddhi Kinni**  
Pharmaceutics



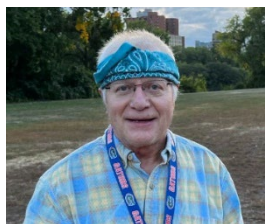


# Pharmaceutics Picnic





# Pharmaceutics Picnic





# Milestones

## Life updates from students, staff, and alumni

**Fangyi Dong, a MS graduate of Dr. Calvin Sun's lab,** returned to China after he graduated in January 2021. In September of this year, he joined the company Accenture as a technology consultant in Shanghai. He's enjoying his work as it allows him to explore a variety of fields such as life science, resources, and production. One of his major responsibilities is helping the company use cloud computing.

**Jiangnan Dun, a PhD graduate of Dr. Calvin Sun's lab,** started a new position in May 2022 as the Program Director (M.S. in Pharmaceutical Science and Technology) and Lecturer in the Department of Pharmacy, National University of Singapore, Singapore. He's enjoying exploring Singapore and learning more about the diverse culture there.

**Jessica Griffith, a PhD graduate of Dr. William Elmquist's lab,** was selected by the *Journal of Pharmacology and Experimental Therapeutics* as a Highlighted Trainee Author for the January 2022 issue.

**Amanda Hokanson, Executive Office & Administrative Specialist for Pharmaceuticals,** will be graduating with an MS in Training and Human Resource Development (TRHRD) from the Univ. of WI- Stout this December. She also completed both the Project Management and HR Generalist professional certificates offered through the University of Minnesota's professional development program. She is currently working on completing the Supervision professional certificate as well. Amanda also assisted in raising \$40k towards the funds donated to the 2022 Gordon Research Conference: Barriers of the CNS, chaired by Dr. Elmquist. Amanda will be celebrating seven years with the Pharmaceuticals Department on Dec. 7, 2022. She also designed the newsletter again this year, so if you like it please let her know!

**Katie M. James, Office Supervisor and Graduate Program Coordinator for Pharmaceuticals,** will be celebrating her 11-year work anniversary with the University of Minnesota this December. Additionally, she has completed the Mental Health First Aid Certification Training. The training course taught participants to identify, understand, and respond to mental health and substance use challenges. Katie is also serving on the College of Pharmacy's Committee for Equity, Diversity, Inclusion, and Accessibility (CEDIA) representing graduate education.

**Makarand (Mak) Jawadekar, a 1982 Pharmaceuticals PhD graduate in Ed Rippie's lab,** had an opportunity this year to travel with the Indiana State Attorney General Todd Rokita to the Doha forum in Doha Qatar, where he represented a delegation from the United States. Also in attendance were former Senator John Kerry and the Attorney General. Additionally Makarand, a board member of the non-profit company Abilities Inc., hosted John McEnroe at a sport night event this past August in New York.

**Hyunjoon Kim, a PhD graduate of Dr. Jayanth Panyam's lab,** started as Assistant Professor at University of Kansas, Department of Pharmaceutical Chemistry this August. The Kim lab will work on developing translational drug delivery system of biopharmaceuticals for immunotherapeutic applications.

**NS Krishna Kumar, a postdoctoral associate in Dr. Raj Suryanarayanan's lab,** gave the following presentations:

- (1) Invited presentation (online) at Boehringer Ingham, Ridgefield, CT on "Dielectric spectroscopy- A molecular mobility characterization tool for small molecules and biologics" (October 06, 2021).
  - (2) Conducted a training course (Online) on "Dielectric Spectroscopy" at Pfizer, Groton, Ct along with Prof. Raj Suryanarayanan (January 20 & 26, 2022).
  - (3) Poster presentation at IPRIME, UMN on "Role of mobility and thermodynamics in the crystallization propensity of amorphous pharmaceuticals" N. S. Krishna Kumar and Raj Suryanarayanan (June 1, 2022).
- R. Lalge, N. Kumar, R. Suryanarayanan. "Abstract T0930-04-21: Role of Drug-Polymer

**Rahul Lalge, a graduate student in Dr. Raj Suryanarayanan's lab,** continues to work on his thesis research which is focused on mechanistic understanding of nucleation and crystal growth during processing and physical stability of amorphous drug products. Involved in industrial and academic collaborations with BASF Pharma Solutions and Argonne National Laboratory, IL respectively for the understanding phase transformations during manufacturing and advanced characterization of pharmaceutical materials.

### Grants/Honors/Awards

Have been part of an industrial collaboration with BASF Pharma Solutions, USA. Received full support to visit BASF Pharma's research facility at Tarrytown NY and conduct the experiments involving advanced characterization of amorphous pharmaceuticals. Recipient of general user research grants to work at U.S. Department of Energy's Advanced Photon Source (APS) Synchrotron X-ray diffraction facility at Argonne National Laboratory, IL. After a competitive proposal process, researchers are fully supported for visits to the beamline (Sector 17-BM) at the APS. Teams arrive at APS with an ongoing research project that can benefit from wide angle X-ray measurements at this facility.



# Milestones

## Life updates from students, staff, and alumni

**Rahul Lalge (continued)** Rahul is currently working with the beamline scientists at Sector 17 and 11, to develop mechanistic understanding of the nucleation and crystal growth in amorphous solid dispersions at the drug-polymer interface.

### Responsibilities

Logistics Coordinator for the Globalization Pharmaceutics Education Network (GPEN 2022) conference organized by the University of Minnesota (to be held in October 2022).

### **Jinghan Li, a graduate student in Dr. Raj**

**Suryanarayanan's lab**, presented his IPEC award-winning research poster titled "Design of Amorphous Solid Dispersions for the Synchronized Release of Two Drugs" at the 2022 AAPS PharmSci360 annual conference held in Boston, MA. Additionally, he presented a poster titled "Investigate Poloxamer 188 as Surfactant for Frozen and Freeze-dried Protein Formulation" at the 2022 International Society of Lyophilization and Freeze Drying (ISLFD) Midwestern Conference in Chicago, IL.

### **Bhushan Munjal, a postdoctoral associate in Dr. Raj**

**Suryanarayanan's lab**, presented the following posters/abstracts:

1. Role of Arginine Salts in Preventing Freezing-Induced Increase in Subvisible Particles in Protein Formulation, Poster presented at International Society of Lyophilization – Freeze Drying, Inc. (ISLFD), Midwest Chapter, Annual Meeting, April 14, 2022 Presentations
2. "Role of Arginine Salts in Preventing Freezing-Induced Increase in Subvisible Particles in Protein Formulation" at *International Society of Lyophilization – Freeze Drying, Inc. (ISLFD)*, Midwest Chapter, Annual Meeting, April 14, 2022
3. "Preventing the loss of excipient functionality in lyophilized formulations" at Lyotalk 2022 USA, Boston, 14-15 July 2022.

**Ronald Sawchuk, an adjunct professor**, recently moved to a new home in Prior Lake, MN. For his address, please email: [sawch001@umn.edu](mailto:sawch001@umn.edu)

### **Jody Tracy, a former Program/Project Specialist in**

**Pharmaceutics**, be leaving the Pharmaceutics department in October 2022 for a role with the new Office of Professional and Clinical Affairs, though she will continue to offer some support through the transition. She first joined the Pharmaceutics department in June 2014 at the front desk. In February 2015, she transitioned to supporting Dr. Sury. Jody will miss working with all of you, and is hopeful that you will still consider her an honorary member of the Pharmaceutics department.

### **Zengtao Wang, a graduate student in Dr. Karunya**

**Kandimalla's lab**, wrote two manuscripts titled, "Semi-mechanistic population pharmacokinetic modeling to investigate amyloid beta trafficking and accumulation at the BBB endothelium" and "Mapping the dynamics of insulin-responsive pathways in the blood-brain barrier endothelium using time-series transcriptomics data." Both manuscripts were published as a first-author in *Molecular Pharmaceutics* and *npj Systems Biology and Applications*, respectively. Additionally, both Zengtao and his fellow graduate student Lushan Wang, were selected by the AAPS president Dr. Andy Vick to present their poster titled, "Prediction of plasma pharmacokinetics from dynamic heart imaging data" in the Special Poster Collection at the 2021 AAPS annual conference held in Philadelphia, PA.

### **Tongzhen Xie, a graduate student in Dr. Carolyn**

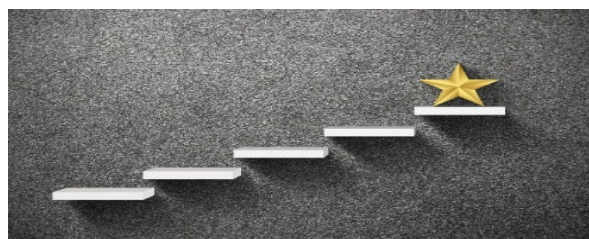
**Fairbanks' lab**, served as the Organizing Committee Co-Chair for the GPEN2022 Biannual Meeting. She was also selected to give an oral presentation during the Datablitz portion of the 2022 American Society for Pharmacology and Experimental Therapeutics (ASPET) Annual Meeting held in Philadelphia, PA. Tongzhen was also selected to give a poster presentation at the Neuropathic Pain Short Interest Group at the 2022 International Association for the Study of Pain (IASP) World Congress on Pain.

### **Wenjuan Zhang, a graduate student in Dr. William**

**Elmqvist's lab**, served as the Organizing Committee Co-Chair for the GPEN2022 Biannual Meeting alongside fellow graduate student, Tongzhen Xie.

### **Tong Zhu, Vice President, Primary Focus Lead, Mitochondria at Astellas Pharma Global**

**Development Inc.** accepted the position of Vice President as of April 2022. In this role, Tong is responsible for providing strategic direction and leadership for the research, development, manufacturing and commercial strategy in Primary Focus Mitochondria globally. Tong also creates/revises the Primary Focus Strategy lead strategic execution of programs in the Primary Focus and manages portfolios within Primary Focus Mitochondria.





# Faculty NewsRoom

## Activities and Updates

### Professor Hongbo Pang



The Pang lab experienced some personnel changes this year:

- Shilpi Singh joined the lab in Sep as a postdoc scholar.
- Yiqin Li joined the lab in Aug as a PhD candidate
- Dr. Yushuang Wei left the lab in Aug to join the Chinese Academy of Science, Shenzhen, China
- Dr. Mahadi Hasan left the lab in Dec last year to join a University in Japan.

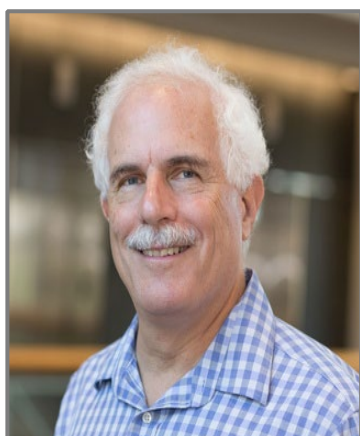
#### Activities:

- Dr. Pang attended and presented at the annual meeting of American Peptide Society, Whistler BC, Canada.
- Dr. Pang and Dr. Xian Wu attended and presented at GRC-drug carrier conference, West Dover, Vermont.
- Dr. Pang and Dr. Hong Guo attend the AACR-JCA joint meeting, Hawaii
- Students (Yuexuan Li, Nianwu Wang and Jiaqi Zhao) present their works at AACR annual meeting and GPEN, 2022
- Other than conferences, Dr. Pang was invited for a talk within UMN (MCC cellular mechanism, pharmacology, UMII) and beyond (Songshan Lake Material Lab).

#### Publications:

In 2022, our works have been published at a number of high impact journals, including ACS Nano for synergistic cell entry (first author: Yushuang Wei), Advanced Science (first author: Xian Wu), Advanced Therapeutics (first author: Xian Wu), and Molecular Pharmaceutics (co-first authors: Yuexuan Li and Nianwu Wang). Additional works are under review.

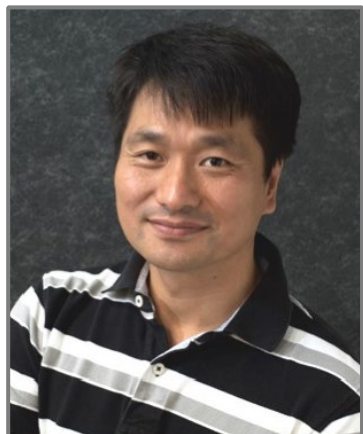
### Professor Ronald A. Siegel



Dr. Ronald A. Siegel became Department Head in the Pharmaceutics Department this year, after serving as Interim Head since 2020. He also continues to direct the Biomaterials and Pharmaceutical Materials (BPM) program for Industrial Partners for Research in Interfacial and Materials Engineering (IPRIME), an industrial/academic consortium at the University of Minnesota.



## Professor Changquan Calvin Sun



Prof. Sun received a grant from NSF for establishing an IUCRC (Phase I, 2022-2027), Center for Integrated Material Science and Engineering for Pharmaceutical Products (CIMSEPP). This center supports research selected by the center industry advisor board, currently consisting of 13 company members. Learn more about CIMSEPP at <https://www.cimsepp.org/>

### Invited presentations

October 21, 2022, Expedited Development of Pharmaceutical Tablets through Integrated Crystal and Particle Engineering, MDRCBB, University of Minnesota, Minneapolis, MN

October 19, 2022 Material Sparing Analytical Tools for Material Property Characterization of Powders, AAPS meeting, Boston, MA

October 14, 2022, Spherical Cocrystallization of Pharmaceuticals, Pharma Crystallization

Summit, Princeton, NJ

August 17, 2022, Enabling Fast Tablet Development through Integrated Crystal and Particle Engineering, J-Star, Cranbury, NJ

August 16, 2022, Strategies for Developing Low Dose Solid Dosage Forms with Good Uniformity, BMS, New Brunswick, NJ

July 20-21, 2022, Role of Nanomechanical Testing of Drugs in Pharmaceutical Tablet Development", International Conference of Nanomechanics for Organic Crystals and Pharmaceutical Applications (NOCPA), Lemon Tree, Gachibowli, Hyderabad, India

July 14, 2022, Excellent CU of Low Dose Direct Compression Tablets Achieved Using Co-processed API, M-CERSI, University of Maryland

July 7, 2022, Crystallographic Origin of the Contrasting Deformation Behaviors of a Molecular Crystal During 3 Point Bending and Powder Compaction, ICCOSS XXV, Macedonia

June 19-24, 2022, Modulating mechanical properties and tableability through crystal engineering, Inspired Design, Assembly and Properties of Molecular Materials, Gordon Research Conference, Grand Summit Hotel at Sunday River, Newry, ME

June 14, 2022, Characterization of Powder Properties Important to Continuous Manufacturing of Tablets, ETC (virtual meeting)

May 18, 2022, Characterization of Powder Properties Important to Continuous Manufacturing of Tablets, PQRI workshop

April 26, 2022, Enable Successful Tablet Formulation Development through Particle and Crystal Engineering, Global Analytical Development Conference-2022, Sandoz Hyderabad, India

April 5, 2022, Ensuring Manufacturability of Tablets: Importance of Powder Properties, Webinar on "Key Challenges & Opportunities in the Process Scale-Up of Oral Solid Dosage Forms" organized by Catalent

February 18-20, 2022, "Enabling Expedited Tablet Development through Crystal Engineering", 6th International Conference on Recent Advances in Material Chemistry, ICRAMC 2022, Department of Chemistry, SRM Institute of Science and Technology, Kattankulathur, Chennai, India

February 2, 2022, "Enabling successful tablet manufacturing of challenging drugs through particle design", Roche, Basel, Switzerland (virtual)

Jan. 13, 2022, Engineering and characterization of mechanical properties of drugs for successful tableting, School of Chemistry and Chemical Engineering, Chongqing University of Science and Technology, China (virtual)



## Professor Timothy Wiedmann



Dr. Wiedmann assisted in the design of preclinical studies with Dr. Nikki Johnston at Milwaukee Medical College to advance inhalation therapy for the treatment of laryngeal inflammation. Work continues with Dr. Amir Naqwi, Abbe Vision, where a high efficiency exposure system was developed for inhalation studies with rodent animal models. Applications include investigating drug therapy for adult respiratory distress syndrome and inhalation of exosome secretion productions for COPD in mouse models. Collaborative research with Dr. Naqwi also included the use of a novel spray system for lung regeneration and administering lung surfactant to a pre-term lamb. He continues to collaborate with Kaohsiung Medical College, Taiwan, to explore the gender-difference in cancer incidence from arising from cooking oil fume exposure. Dr. Wiedmann co-advises MS student, Zijian Wang. Dr. Wiedmann will complete his last year of phase retirement at 25% FTE with complete retirement at the end of June 2023.

Poster:

### **Stem Cell Sprayer for Lung Bioengineering**

Amir A. Naqwi<sup>1,2\*</sup>, Timothy S. Wiedmann<sup>3</sup>, Kyleigh Pacello<sup>3</sup>, Steven Skolasinski<sup>3</sup>, Long Nguyen<sup>3</sup>, Abhilash Ojha<sup>3</sup>, Christopher Hogan<sup>3</sup>, Angela Panoskaltsis-Mortari<sup>3</sup>, <sup>1</sup>Abbe Vision, Inc., <sup>2</sup>Univ. of St. Thomas, St. Paul, MN, <sup>3</sup>Univ. of MN, Minnesota, United States.

*ILASS-Americas 32nd Annual Conference on Liquid Atomization and Spray Systems, May 22-25, 2022.*





# Recent Publications

## Publications: Dr. Ronald Siegel

S. Panja, A. Siehr, A. Sahoo, R.A. Siegel, and W. Shen, "Biodegradable elastomers enabling thermoprocessing below 100 °C," *Biomacromolecules*, 23, 163-173 (2022) DOI: 10.1021/acs.biomac.1c01197

S. Baghersad, A. Hivechi, S.H. Bahrami, P.B. Milan, R.A. Siegel, and M. Amoupour, "Optimal Aloe vera encapsulated PCL/Gel nanofiber design for skin substitute application and the evaluation of its in in-vivo implantation," *J Drug Deliv Sci Technol*, 74, 103536 (2022) DOI: 10.1016/j.jddst.2022.103536

K.M.H. Jain, H.H. Hou, and R.A. Siegel. "An artificial gut/absorption simulator: Description, modeling, and validation using caffeine," *AAPS J*, 24, 87 (2022) DOI: 10.1208/s12248-022-00721-1

## Publications: Dr. Chanquan Calvin Sun

Song Z. Wang, M. Solomos, S. Axnanda, B. Chen, M. Figus, L. Schenck\*, C.C. Sun\*, Varied bulk powder properties of micro sized API within size specifications as a result of particle engineering methods, *Pharmaceutics*, 14:1901 (2022) <https://doi.org/10.3390/pharmaceutics14091901>

S. Song, C. Wang, B. Zhang, C.C. Sun, T.P. Lodge, and R.A. Siegel\*, A rheological approach for predicting physical stability of amorphous solid dispersions, *J. Pharm. Sci.*, accepted, <https://doi.org/10.1016/j.xphs.2022.08.028>

X. Hao, J. Li, C. Wang, X. Zhao, X. He\*, C.C. Sun\*, Profoundly improved photostability of dimetronidazole by cocrystallization, *CrystEngComm*, 24:6165 – 6171 (2022)

S. Paul, C. Wang, C.C. Sun\*, An extended macroindentation method for determining the hardness of poorly compressible materials, *Int. J. Pharm.*, 624:122054 (2022) <https://doi.org/10.1016/j.iijpharm.2022.122054>

D. Chen\*, W. Huang, Q. Sun, Z. Zhang, Y. Guo, G. Vreeman, C.C. Sun\*, B-S. Yang, M. Hawley, X. He, Bioavailability Enhancing Cocrystals: screening, in vivo predicative dissolution, and supersaturation maintenance, *Cryst. Growth Des.*, 22:5154–5167 (2022) <https://doi.org/10.1021/acs.cgd.1c00950>

C. Wang and C.C. Sun\*. Mechanisms of crystal plasticization by lattice water, *Pharm. Res.*, (2022) 10.1007/s11095-022-03221-1

G. Vreeman and C.C. Sun\*, A powder tableability equation, *Powder Technol.*, 408:117709 (2022)

C. Wang, Z. Wang, A. Friedrich, C.C. Sun\*, Effect of deaeration on processability of poorly flowing powders by roller compaction, *Int. J. Pharm.*, 621:121803 (2022)

Y. Guo and C.C. Sun\*, Profound effects of gastric secretion rate on the pH-dependent precipitation of erlotinib in duodenum, *Int. J. Pharm.*, 619:121722 (2022)

N. Shetty, J. Hou, E. Yanez, J. Shur, J. Cheng, C.C. Sun, K. Nagapudi\*, and A.S. Narang\*, Effect of lipidic excipients on the properties and performance of high drug load spray dried particles for inhalation, *J. Pharm. Sci.*, 111:1152-1163 (2022)

S. Majumder, C.C. Sun\*, N. A. Mara\*, Nanomechanical testing in drug delivery: theory, applications, and emerging trends, *Adv. Drug Del. Rev.*, 183:114167 (2022)



# Recent Publications (continued)

Z. Gao, S. Liu\*, C.C. Sun\*, Complexation with aromatic carboxylic acids expands the solid-state landscape of berberine, *Int. J. Pharm.*, 617:121587 (2022)

K. Wang, Y. Hao, C. Wang, X. Zhao, X. He\*, C.C. Sun\*, Simultaneous improvement of physical stability, dissolution, bioavailability, and antithrombus efficacy of Aspirin and Ligustrazine through cocrystallization, *Int. J. Pharm.*, 616:121541 (2022)

G. Vreeman and C.C. Sun\*, Air entrapment during tablet compression – diagnosis, impact on tableting performance, and mitigation strategies, *Int. J. Pharm.*, 615:121514 (2022)

G. Vreeman and C.C. Sun\*, Stress transmission ratio as a reliable parameter for quantifying powder plasticity, *Powder Technol.*, 398:117066 (2022)

Y. Guo and C.C. Sun\*, Pharmaceutical lauryl sulfate salts – Prevalence, formation rules and formulation implications, *Mol. Pharm.*, 19:432-439 (2022)

Y. Guo and C.C. Sun\*, Formulation strategies for mitigating dissolution reduction of PABA by sodium lauryl sulfate through diffusion layer modulation, *Int. J. Pharm.*, 611: 121310 (2022)

## Publications: Dr. Raj Suryanarayanan

(>190 refereed publications; N citations >7,970; h=53, per Google Scholar as of 9/8/2022)

N.K. Duggirala, J. Sonje, X. Yuan, E. Shalae, R. Suryanarayanan, Phase behavior of Poloxamer 188 in frozen aqueous solutions – Influence of processing conditions and cosolutes. *Int J Pharm*, 609, 112145 (2021)

J. Sonje, S. Thakral, S. Krueger, R. Suryanarayanan, Reversible self-association in lactate dehydrogenase during freeze-thaw in buffered solutions using neutron scattering. *Mol Pharm*, 18(12), 4459-4474 (2021).

N. Kaur, G. Haustad, R. Suryanarayanan, Use of Atomic Force Microscopy (AFM) to monitor surface crystallization in caffeine-oxalic acid (CAFOXA) cocrystal compacts. *Int J Pharm*, 609, 121196 (2021).

R. Chinnasamy, B. Munjal, R. Suryanarayanan, A.M.P. Peedikakkal, M.K. Mishra, S. Ghosh, Pressure and Temperature Induced Dual Responsive Molecular Crystals: Effect of Polymorphism. *Cryst Growth Des*, 22(1), 615-624 (2021).

B. Munjal, B. & R. Suryanarayanan, Applications of synchrotron powder X-ray diffractometry in drug substance and drug product characterization. *TrAC Trends in Analytical Chemistry*, 116181 [Online Publication ahead of Print] (2021).

N.S.K. Kumar, R. Suryanarayanan, Crystallization Propensity of Amorphous Pharmaceuticals: Kinetics and Thermodynamics. *Mol Pharm*, 19(2), 472-483 (2022).

B. Munjal, S.M. Patel, R. Suryanarayanan, Role of arginine salts in preventing freezing-induced increase in subvisible particles in protein formulations. *Int J Pharm*, 619, 121694 (2022).

A. Ukidve, K.B. Rembert, R. Vanipenta, P. Dorion, P. Lafarguette, T. McCoy, A. Saluja, R. Suryanarayanan, S. Patke, Succinate Buffer in Biologics Products: Real-world Formulation Considerations, Processing Risks and Mitigation Strategies. *J Pharm Sci* [ePub ahead of print] (2022).

R. Lalge, N. Kaur, N.K. Duggirala, R. Suryanarayanan, Dual Functionality of Bile Acid: Physical Stabilization of Drugs in the Amorphous Form and Solubility Enhancement in Solution. *Mol Pharm*, 19(7), 2595-2606 (2022).



# Recent Publications (continued)

J. Sonje, S. Thakral, B. Mayhugh, G. Sacha, S. Nail, J. Srinivasan, R. Suryanarayanan, Mannitol hemihydrate in lyophilized protein formulations: Impact of its dehydration during storage on sucrose crystallinity and protein stability. *Int J Pharm*, 624, 121974 (2022).

J. Sonje, C.F. Chisholm, R. Suryanarayanan, Frozen Storage of Proteins: Use of Mannitol to Generate a Homogenous Freeze-concentrate. *Int J Pharm*, 121995 (2022).

J. Li, N.K. Duggirala, N.S.K. Kumar, Y. Su, R. Suryanarayanan, Design of Ternary Amorphous Solid Dispersions for Enhanced Dissolution of Drug Combinations. *Mol Pharm*, 19(8), 2950-2961 (2022).

J. Sonje, C.F. Chisholm, R. Suryanarayanan, Frozen storage of proteins: Use of mannitol to generate a homogenous freeze-concentrate. *Int J Pharm*, 121995 (2022).

S. Thakral, J. Sonje, B. Munjal, B. Bhatnagar, R. Suryanarayanan, Mannitol as an excipient for lyophilized injectable formulations. *J Pharm Sci*, doi: <https://doi.org/10.1016/j.xphs.2022.08.029> [ePub ahead of print] (2022).

## Invited lectures at meetings of scientific organizations

“Role of excipient and molecular mobility in stabilizing lyophilized protein,” in the symposium session: Role of excipients in formulation drug product development at the AAPS Annual Meeting, Philadelphia, PA, Oct 17-20, 2021.

“Recent advances in the solid state drug product characterization”, valedictory address at Pharma LabNext Conclave 2021, organized by Express Pharma, October 29, 2021 (remote conference).

“Role of excipients in frozen and freeze-dried protein formulations,” in the Distinguished Scholars Session at the NIPTE Annual Research Conference – Accelerating the Drug Development Process, Tuesday, November 30, 2021.

“The role of excipients in efficient drug delivery”, SNJB (Scientific and Novel Juvenilia Batten) Pharmacon 21 on Research, Innovations and Technologies: Challenges and Opportunities in Pharmaceutical Science (virtual conference), India, December 5, 2021.

“Excipient phase behavior in frozen and freeze-dried systems – Potential implications on drug stability”, webinar organized by the AAPS NIPER Student Chapter – S.A.S. Nagar, presented virtually on August 18, 2022.

Invited lectures at universities & pharmaceutical companies “Inorganic atomic layer coating- a strategy to prevent moisture mediated phase transformation of pharmaceutically relevant compounds,” presented at Applied Materials, Inc. in Santa Clara, CA, October 22, 2021.

“Challenges with amorphous pharmaceuticals”, a keynote lecture delivered at the International Conference on Advances in the Dynamics and Thermodynamics of Glass Forming Systems, Department of Physics, University of Calicut, India, March 22, 2022.

“Excipient phase behavior in frozen and freeze-dried systems – Potential implications on drug stability”, delivered as part of the University of Texas’ Division of Molecular Pharmaceutics; Drug Delivery Seminar Series, on April 4, 2022.

“The role of excipients in efficient drug delivery,” International Flavors & Fragrances Inc., Midland, Michigan, June 16, 2022.





# Recent Publications (continued)

## Current Grants

Sponsor: National Institute for Pharmaceutical Technology & Education, Inc. (NIPTE);

Funding Source: NIH/FDA

Project Title: "Platform for reliable characterization and evaluation of comparability of biosimilar drug products in lyophilized and liquid formulations"

Dates: 09/01/2022- 08/31/2024

Total: \$1,976,692

Sury's Role: PI

Sponsor/Funder: Boehringer-Ingelheim

Project Title: "Performance of amorphous solid dispersions: Role of residual drug crystallinity"

Dates: 07/15/2021- 07/15/2023

Total: \$65,088

Sury's Role: PI

Sponsor: Center for Pharmaceutical Processing Research (CPPR)

Industrial Members/Funders: Genentech, Inc. & Janssen Pharmaceuticals

Sury's Role: PI

The goal of this study is to investigate, at the precompetitive stage, processing-related research problems. We have investigated numerous problems relating to processing induced phase transformations. Our efforts are focused on evaluating the stability of amorphous solid dispersions. The two current sub-projects are listed below.

Current Project 1: "Exploring the multi-functionality of excipients for lyophilized formulations"

(Bhushan Munjal)

Dates: 11/01/2020- 10/31/2022

Total: \$110,000

Current Project 2: "Poloxamer 188 – a surfactant for frozen and freeze- dried protein formulations"

(Jinghan Li)

Dates: 11/01/2021- 10/31/2023

Total: \$115,000

## **Publications: Dr. Timothy Wiedmann**

Acrolein Increases the Pulmonary Tumorigenic Activity of the Tobacco-Specific Nitrosamine

4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK). Lisa A. Peterson,\* Donna Seabloom, William E. Smith, Karin R. Vevang, Davis M. Seelig, Lin Zhang, and Timothy S. Wiedmann. Chemical Research in Toxicology Online: <https://doi.org/10.1021/acs.chemrestox.2c00135>

Modulating insulin signaling and trafficking at the blood-brain barrier endothelium using lipid based nanoemulsions. Lushan Wang, Timothy S. Wiedmann, Karunya K. Kandimalla. International Journal of Pharmaceutics Volume 622, 25 June 2022, 121823.

Johnston, N., Samuels, T. L., Goetz, C. J., Arnold, L. A., Smith, B. C., Seabloom, D. E., Wuertz, B. R., Ondrey, F., Wiedmann, T. S., Vuksanovic, N., Silvaggi, N. R., MacKinnon, A. C., Miller, J., Bock, J., & Blumin, J. H. (Accepted/In press). Oral and Inhaled Fosamprenavir Reverses Pepsin-Induced Damaged in a Laryngopharyngeal Reflux Mouse Model. *Laryngoscope* 2022 Jun 9. doi: 10.1002/lary.30242. Online ahead of print.

