



MINNECEUTICS

Indispensable News.

University of Minnesota Department of Pharmaceutics

Awards & Achievements

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Highlighting student and faculty success in 2019-2020.

Message from the Directors of Graduate Studies

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How the Pharmaceutics graduate program is responding to COVID-19.

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Photos from our lives. Want to be included next year? Send us yours!

2020 Issue

A Message to Our Friends

Dear Friends,

Much has been demanded of us during this year of trials. One of those demands was the ability to pivot. Pivoting allows for a change in direction without losing connection to a central point. For us that translates into being flexible, but not breakable; changing our course, but not our core.

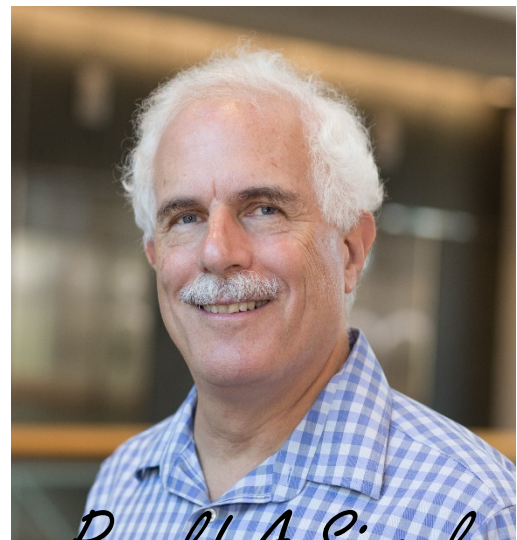
Our first pivot was this February, when I was elected as Interim Department Head. I took over from Dr. Calvin Sun who graciously served as Temporary Department Head since last November. He led the department well during a time of transition; I want to extend our gratitude to him for it. (Calvin remains as both Associate Department Head and Director of Graduate Studies.) While I am honored to serve as Interim Department Head, we look forward to searching for the next permanent Department Head. We hope to start this search soon, but are currently delayed due to COVID-19.

In March, several larger pivots were required. In response to COVID-19, classes moved online, faculty, students and staff settled into work from home, and our labs went into hibernation. Committed to the safety of its members, our department used this hibernation period to carefully devise its Sunrise Plan. By late May, we were able to slowly reopen, taking precautions to socially distance in the labs and common areas, encouraging faculty, students, and staff to continue to work from home whenever possible, and providing PPE and sanitizing supplies to all who need them to safely conduct their work and research on campus.

These pivots would not have been successful without the support of our students, faculty, and staff, who embraced the challenges and have continued to thrive. Faculty adapted their courses and staff found creative solutions to keep the department running smoothly. Students attended their graduation ceremony on Zoom.

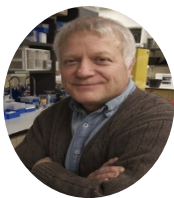
Although we were not be able to see each other at AAPS this year, there are still ways to connect. Our seminar series, for example, is now fully online and drawing more attendees with larger diversity than ever before. We hope to offer our series to anyone who wishes to learn more about the dynamic research being conducted in our department. If you or someone you know would like to join, please contact our Graduate Program Coordinator, Katie James, at kmjames@umn.edu for details.

In closing, I welcome your feedback on any departmental activity and look forward to the time when we can safely meet again at professional meetings. Until then, please take care and stay safe.



Ronald A. Siegel
Interim 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

Aktham Aburub, PhD, Eli Lilly & Co.

Walid M. Awni, PhD, Intellia Therapeutics, Inc.

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

Purna Kashyap, MBBS, Mayo Clinic

Susan Krueger, PhD, NIST Center for Neutron
Research

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

Z. Jane Li, PhD, Pharmaron

Mukesh Pandey, PhD, MRSC, Mayo Clinic

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

Evgenyi Y. Shalaev, PhD, Allergan

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

Zheng Yang, PhD, Bristol Myers Squibb

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

Cheryl L. Zimmerman, RPh, PhD, Professor
Emeritus



Degrees Earned in 2019-2020



Anqi Lu, MS

Advisors: Professors Jayanth Panyam and Timothy Wiedmann
Thesis: *Factor Analysis of Drug Loading of Nanoparticles Using Flash Nanoprecipitation*



Drishti Sehgal, PhD

Advisor: Professor Jayanth Panyam
Thesis: *Antibody glycoengineering for drug delivery applications*



Hongbo Chen, PhD

Advisor: Professor Calvin Sun
Thesis: *Improving the Manufacturability and Dissolution Performance of Drugs Through Spherical Crystallization*



Kunlin Wang, PhD

Advisor: Professor Calvin Sun
Thesis: *Enabling Tablet Development of Celecoxib Through Solid State Engineering*



Shao-Yu Chang, PhD

Advisor: Professor Calvin Sun
Thesis: *Interfacial Bonding Strength in Bilayer Tablets – Mechanism and Engineering*



Yihan Wang, MS

Advisor: Professor Hongbo Pang
Thesis: *Targeting Tumor-Associated Macrophages with PI3K γ Inhibitor-Loaded Nanocarriers for Cancer Therapy*



Zhengxuan Liang, MS

Advisor: Professor Calvin Sun
Thesis: *Two loratadine-oxalic acid crystals with enhanced dissolution rate*

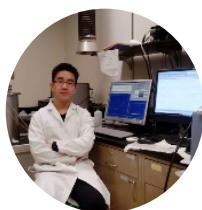
Congratulations
to all our graduates

Graduation Luncheon 2020



Congratulations Pharmaceutics 2020 Graduates!
&
***Thank you to everyone who attended our ceremony
 and supported our graduate students during this unique year!***

We also want to welcome the following students as they start their PhD journey:



Jingshan Li
 Advisor: Professor
 Raj Suryanarayanan



Vrishali Salian
 Advisor: Professor
 Karunya Kandimalla



Sichen Song
 Advisor: Professor
 Ronald Siegel

2020-2021 Fellowships & Grants



Awardee: Ben Clements

Advisor: Dr. Carolyn Fairbanks

Neuroscience Training in Drug Abuse Research Training Grant

This training grant is supported by the National Institute on Drug Abuse and appoints a student as a Pre-Doctoral Fellow.



Awardee: Yiwang Guo

Advisor: Dr. Calvin Sun

David J.W. Grant and Marilyn J. Grant Fellowship in Physical Pharmacy

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

Graduate School Doctoral Dissertation Fellowship

This fellowship gives the University's most accomplished PhD candidates an opportunity to devote full-time effort to an outstanding research project by providing time to finalize and write a dissertation during the fellowship year.

U of M Council of Graduate Students (COGS) Career Development Grant

This grant is intended to help develop graduate student careers by making trainings and workshops more affordable.

2020-2021 Fellowships & Grants



Awardee: Navpreet Kaur

Advisor: Dr. Raj Suryanarayanan

David J.W. Grant and Marilyn J. Grant Fellowship in Physical Pharmacy

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

Ted Rowell Graduate Fellowship

This fellowship is 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.

U of M Council of Graduate Students (COGS) Career Development Grant

This grant is intended to help develop graduate student careers by making trainings and workshops more affordable.

U of M Council of Graduate Students (COGS) Conference Travel Grant

This grant is intended for travel to present original work affiliated with the University of Minnesota at a conference with a poster, oral presentation, or other acceptable format.



Awardee: Sneha Rathi

Advisor: Dr. William Elmquist

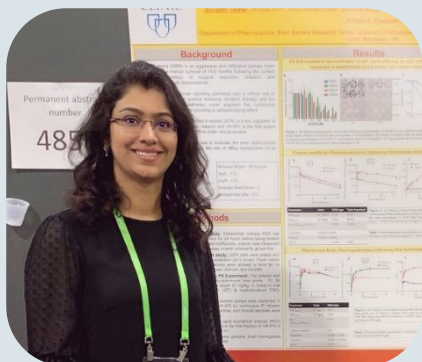
Edward G. Rippie Fellowship

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

Rory P. Remmel and Cheryl L. Zimmerman Fellowship

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

2020-2021 Fellowships & Grants



Awardee: Surabhi Talele

Advisor: Dr. William Elmquist

Bighley Graduate Fellowship

This fellowship is awarded to full-time College of Pharmacy PhD graduate students who have great potential and are conducting research in Basic and Applied Pharmaceutical Sciences.



Awardee: Andrew Zhou

Advisor: Dr. Karunya Kandimalla

Ronald J. Sawchuk Fellowship

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

Dr. Paul B. Myrdal Memorial Pre-Doctoral Fellowship

This fellowship is awarded by the American Foundation for Pharmaceutical Education (AFPE) to students who possess the skill and aptitude to become outstanding scientists and leaders in the field of Pharmaceutics.

Awards & Achievements

Highlighting Success in 2019-2020



Andrew Zhou

College of Pharmacy 2020 3MT Competition: Runner-Up Award

This competition challenges research students to communicate the significance of their thesis projects to a general audience in just three minutes with the aid of a single static slide. This award includes a \$500 travel grant.



Rahul Lalge

College of Pharmacy 2020 3MT Competition: People's Choice Award

This competition challenges research students to communicate the significance of their thesis projects to a general audience in just three minutes with the aid of a single static slide. This award includes a \$500 travel grant.



Gerrit Vreeman

2019-2020 Outstanding TA Award

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



Sneha Rathi

2019-2020 Outstanding TA Award

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



Hongbo Chen

2020 NIPTE Outstanding Student Research Award

This award is given annually to graduate students with outstanding scientific achievements in the areas of Pharmaceutical Science and Technology.



Tongzhen Xie

2019-2020 Outstanding TA Award

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



Manan Shah

American Association of Indian Pharmaceutical Scientists (AAiPS) 2020 Graduate Research Award



Vrishali Salian

1. American Association of Indian Pharmaceutical Scientists (AAiPS) 2020 Graduate Research Award
2. AAPS 360 Best Poster Award
Discovery and Basic Research Track



Navpreet Kaur

1. Robert L. Snyder Student Award
2. Best Poster Award at the Denver Xray Conference 2020
3. IPEC Foundation 2020 Graduate Student Award
4. ACS CTA/YCC Leadership Development Award

Awards & Achievements

Highlighting Success in 2019-2020



Dr. William Elmquist

2019 Adviser of the Year

Dr. Elmquist was voted by graduate students as an outstanding adviser, along with Dr. Ling Li in Experimental and Clinical Pharmacology. Awardees are recognized for enhancing the learning experience for graduate students and surpassing traditional advising requirements.



Dr. Hongbo Pang

Minnesota Partnership Award

This award was given to Dr. Pang along with his Mayo Clinic colleague, Dr. David Daniels, for their project, "Peptide-Guided Delivery System to Improve Treatment for Pediatric Diffuse Intrinsic Pontine Gliomas." The grant total awarded was \$870,000.



Dr. Carolyn Fairbanks

Chair-Elect for the Division of Neuropharmacology of ASPET

Dr. Fairbanks was elected by The American Society for Pharmacology and Experimental Therapeutics.

Featured by the Office of Academic Clinical Affairs (OCA)

Dr. Fairbanks and Dr. George Wilcox were featured by OACA for their ongoing research related to non-opioid treatment of chronic pain.



Dr. Cheryl Zimmerman

Distinguished Alumni Award in Pharmaceutical Sciences and Research

This award was given to Dr. Zimmerman by the School of Pharmacy at the University of Washington as part of the school's 125th anniversary celebration in recognition of her contributions to pharmacy education and pharmaceutical research. Dr. Zimmerman considers this award to be the capstone achievement of her career.



Dr. Karunya Kandimalla

Elected Senior Member-at-Large for the Neuroimaging program

area at the Alzheimer's Association-International Society to Advance Alzheimer's Research and Treatment.

From the Directors of Graduate Studies

Dear Friends and Colleagues,

First of all, we wish the entire UMN Pharmaceutics family a safe journey through the health, financial, and social challenges posed by COVID-19. The pandemic has changed everyone's life. Except for the laboratories that conduct COVID-related research and carry out certain essential functions, all the laboratories were initially shut down on the governor's executive order to curb the spread of the virus. Thanks to a thoughtful laboratory resumption plan developed at the University and College levels, and executed by the Associate Dean of Research and Pharmaceutics faculty member Professor Carolyn Fairbanks, the shutdown only lasted for about 4 months. Now, students have all returned to the labs to continue their research. However, stringent safety measures are still being enforced to protect everyone's health and safety. Consequently, the research productivity is only a fraction of what it has normally been. We have converted essentially all activities, including courses, department seminars, and group meetings into an online format. Although we miss the personal interactions, the online format does allow recording of seminars and lectures. We recently attended the online Graduate School Career Fair organized by the University of Minnesota, but only a handful of undergraduate students inquired about our program. The COVID-19 pandemic has certainly changed everything.

Despite facing several challenges posed by the pandemic, our program continues to maintain a good output of graduate students, with four PhD students and three MS students graduating in the past year. As you will see elsewhere in this newsletter, our students continue to win awards and maintain outstanding research productivity. Due to the dedication and perseverance of our students and faculty, we are certain that we will emerge from this pandemic even stronger.

This year, as in years before, we had a large number of exceptionally strong candidates apply to our program. However, we could only accept three new PhD students, as the program needed to absorb some graduate students of Professor Panyam, who as you may be already aware, moved to Temple University as the Dean of their School of Pharmacy. It is noteworthy that all three new doctoral students we admitted are the graduates from our MS program. They emerged as highly competitive because they have had nearly two years of training in our program and received mentorship to find their genuine research interest and demonstrate excellence. This stands as a testament to the quality and contribution of our MS program to the overall Pharmaceutics education and training.

Although, the COVID-19 pandemic forced us to temporarily halt our summer research program, which is intended to engage domestic students early in their undergraduate careers, we plan to resume the program in the Summer 2021.

In conclusion, we remind you of the standing invitation we have for you to play a more active role in our graduate program. Follow us on LinkedIn, Twitter, and Facebook for updates. We are eager to see many of you at the virtual Pharmaceutics Alumni Event in December. Until then, stay safe and healthy.



Changquan Calvin Sun, PhD
Director of Graduate Studies



Karunya Kandimalla, PhD
Associate Director of Graduate Studies

Graduate Student Organizations

Elected 2020-2021

AAPS UMN Student Chapter Officers



Chair
Lushan Wang
Pharmaceutics



Chair-Elect
Sneha Rathi
Pharmaceutics



Treasurer
Pooja Hegde
Medicinal Chemistry



Secretary
Tongzhen Xie
Pharmaceutics



Web Coordinator
Chenxu Li
Pharmaceutics



Student Outreach
Mei-Chi Su
Experimental & Clinical
Pharmacology

Pharmaceutics Graduate Student Representatives



Gerrit Vreeman
Pharmaceutics



Rahul Lalge
Pharmaceutics

COGS Pharmaceutics Representative



Navpreet Kaur
Pharmaceutics

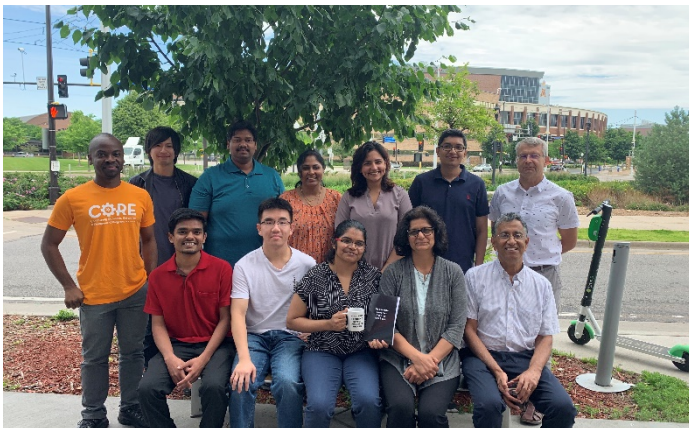
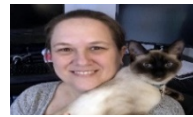
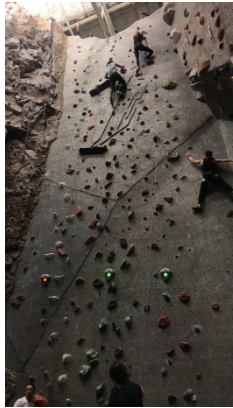
You are cordially invited!

**UMN PHARMACEUTICS
ALUMNI
VIRTUAL EVENT**

**Friday, December 4, 2020
9:00 to 10:30 AM CST
Online via Zoom**

A Zoom link invitation was sent to those who submitted an RSVP by November 30, 2020. If you would like to join the event but have not submitted an RSVP, please contact Katie James at kmjames@umn.edu.

A Year in Photos



Milestones

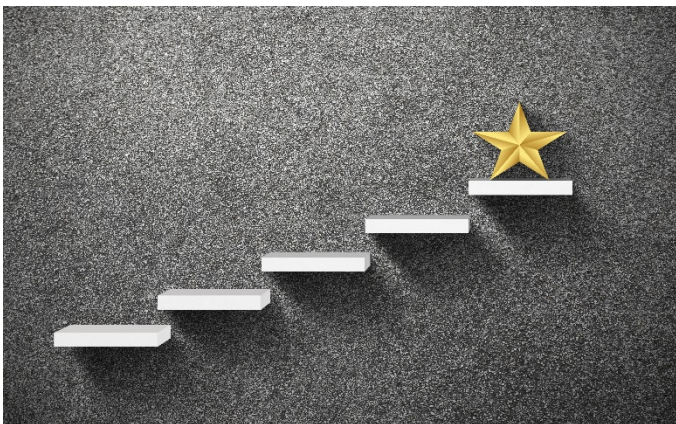
Life updates from students, staff, and alumni

Gilbert Banker, who served as the Dean of the University of Minnesota College of Pharmacy and a Professor in Pharmaceutics from 1985-1992, passed away in February 2020. Dr. Banker left an indelible mark on the pharmacy profession through his commitment to higher education, his tremendous body of research, and his outstanding leadership. He remains highly regarded among faculty, staff, students, and alumni, and the College of Pharmacy is forever grateful for his many contributions.

Jiangnan Dun, a Pharmaceutics PhD graduate, left the US this year to join F. Hoffmann-La Roche AG in Basel, Switzerland as a Post-Doctoral Research Fellow.

Yuangdong (Alex) Gu, a Pharmaceutics PhD graduate, was appointed Dean of the School of Microelectronics at Shanghai University in 2020. Alex remarks that his position is "unusual and it also means a lot of responsibilities. Regardless, I am still a proud pharmaceutical Gopher."

Amanda Hokanson, Executive Office & Administrative Specialist for Pharmaceutics, began her MS in Training and Human Resource Development (TRHRD) this fall through the University of Wisconsin Stout. She also completed the "Perfectionnement" CECR level C1 advanced immersion course at the Alliance Française, became a member of the Association for Talent Development (ATD), and trained as a volunteer ESL instructor for the Minnesota Literacy Council. The newsletter redesign as of 2020 is also her doing, so send her a message if you like it! In her pre-pandemic travels, Amanda visited the east coast last fall to reconnect with friends of the department. She also enjoyed the great outdoors on a trip to the Grand Canyon, Bryce Canyon, and Zion National Park. Amanda will be celebrating five years with the Pharmaceutics Department on December 7, 2020.



Katie M. James, Office Supervisor and Graduate Program Coordinator for Pharmaceutics, attended the National Association of Graduate Admission Professionals (NAGAP) Virtual Fall Institute in October 2020. She also recently started serving on the College's Engagement and Wellbeing Workgroup as well as the Affinity Allies Group. July marked Katie's five year anniversary with the Pharmaceutics Department and her eight year anniversary with the College of Pharmacy.

Makarand Jawadekar, a Pharmaceutics PhD graduate, met with now Attorney General for Indiana Todd Rokita and Vice President Michael Pence at a private celebratory luncheon hosted by Brent and Bridget Tilson at their home in Greenwood, Indiana. (Brent is the Author of the bestseller Forbes book: *Go Slow to Grow Fast*) . Makarand was able to spend almost 90 minutes with the Vice President discussing potential vaccines and therapies for COVID-19. VP Pence requested Makarand's help with the COVID-19 Task Force and expressed his appreciation of Makarand's status as a University of Minnesota alumnus, as Mr. Pence said he considers the U of M to be one of the best Midwestern Universities.

Ameya Kirtane, a Pharmaceutics PhD graduate, and his wife Eileen welcomed their son Aditya 'Adi' Leo Kirtane on April 24, 2020. Ameya has also published his work on the development of a once-a-month oral contraceptive pill in the journal *Science Translational Medicine*. This work received much media attention including coverage from BBC, WIRED, CBS Boston, and The Guardian, to name a few. Ameya made his radio debut as a guest on an Irish radio show called *Hard Shoulder*, and his television debut in a news story on Boston 25 News. Watching and hearing himself back, Ameya has ascertained that he is unlikely to have a thriving career in show business. In March 2020, Ameya concluded his post-doctoral training and took up the position of Instructor in Medicine at Brigham and Women's Hospital, Harvard Medical School. His work there focuses on the development of drug delivery systems for infectious diseases, cancer, and global health.

Milestones

Life updates from students, staff, and alumni

Rahul Lalge, a current graduate student in Dr. Raj Suryanarayanan's lab, passed his preliminary oral examination and is continuing to work on his dissertation research as a PhD candidate. He co-wrote a manuscript with Dr. Sampada Koranne and Dr. Raj Suryanarayanan titled "*Modulation of Microenvironmental Acidity: A Strategy to Mitigate Salt Disproportionation in Drug Product Environment*" that was published in *Molecular Pharmaceutics*.

Elizabeth CM de Lange, Professor in Predictive Pharmacology, Research Division of Systems Biomedicine and Pharmacology LACDR, Leiden University, is the coordinator of the new project, started in January 2020, by the European consortium QSPainRelief on optimizing drug combinations for improving analgesia and diminishing side effects (sedation, cognitive impairment, abuse liability) by developing an *in silico* framework. More information can be found at qspainrelief.eu.

Sibo Liu, a Pharmaceutics MS graduate, started as a Preformulation Scientist at Nyxist in June 2020.

Purnanand Sarma, a former Post-Doctoral Associate in Dr. Raj Suryanarayanan's lab, announced the successful completion of the initial public offering of the company Immunome, which was awarded a \$13 million grant from the US Department of Defense to fight COVID-19 (please visit the sites below to learn more).

<https://www.businesswire.com/news/home/20201001006200/en/Immunome-Announces-Pricing-of-Upsized-Initial-Public-Offering>

<https://www.businesswire.com/news/home/20201013006008/en/Immunome-Announces-Exercise-in-Full-and-Closing-of-Over-Allotment-Option-in-Initial-Public-Offering>

<https://www.businesswire.com/news/home/20200728005197/en/Immunome-Awarded-Department-of-Defense-Contract-to-Develop-Biosynthetic-Convalescent-Plasma-for-COVID-19>

<https://apnews.com/press-release/business-wire/products-and-services-mers-microbiology-medical-schools-science-97ae6b5c0bf141429673ea414bcb9371>

Marilyn Speedie, who served as Dean of the College of Pharmacy from 1996-2017, formally retired and became an emeritus faculty member in July 2020. Prior to her retirement, she taught in the Department of Medicinal Chemistry as a faculty member after formally stepping down from her role as Dean. She also taught in the PharmD program, provided leadership for the Center for Leading Healthcare Change, and actively advocated for the Pharmacy profession via the Minnesota Pharmacy Alliance.

Seema Thakral, a former Post-Doctoral Associate in Dr. Raj Suryanarayanan's lab, presented a webinar on the topic *Anomalous behavior of mannitol hemihydrate: Implications on sucrose crystallization in colyophilized systems* in May 2020. The webinar was organized by SP Scientific and was attended by ~100 participants from academia and industry.

Jody Tracy, Program/Project Specialist for Pharmaceutics and Clinical Affairs, was selected as a member of the first cohort of the Leading Change and Project Management Initiative. The eight-week program is designed to teach and hone project management skills. Jody also helped lead a student engagement adventure at the Vertical Endeavors wall-climbing center.

Kunlin Wang, a Pharmaceutics PhD graduate, left the US in November 2020 to accept a position as a Research Manager at Scientific Finder in Guangzhou, China.

Lushan Wang, a current graduate student in Dr. Karunya Kandimalla's lab, presented a poster titled "*Impact of Amyloid β Peptides on Glucose Trafficking in Alzheimer's Brain*" at the AAPS PharmSci 360 Annual Meeting in San Antonio, Texas (November 2019).

Dee Weaver, honorary First Lady of the College of Pharmacy, celebrated her 98th birthday with the College of Pharmacy and the Century Mortar Club. She remains a steadfast supporter of the College of Pharmacy and its students.

Yuanyuan Xie, a Pharmaceutics PhD graduate, joined Genfleet Therapeutics in Shanghai, China in 2020 as their Executive Director in Pharmaceutical Development. Genfleet Therapeutics is a China-based R&D biotech company pursuing innovative therapeutic molecules, small and large, across numerous oncology and immunology indications. Yuanyuan's responsibility is to develop commercial delivery methods for the new molecule design in order to cure more and more patients.

Philadelphia Fun

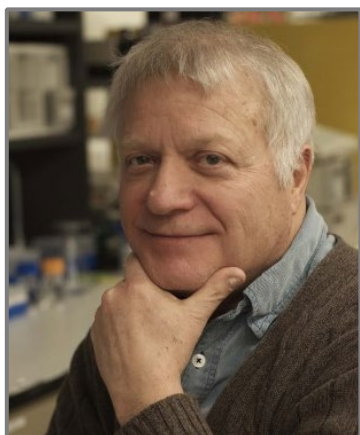
Greetings from our members at Temple



Faculty NewsRoom

Activities and Updates

Professor William Elmquist



Dr. William Elmquist was voted advisor of the year, along with Dr. Ling Li in Experimental and Clinical Pharmacology, by graduate students in the College of Pharmacy. Awardees are recognized for enhancing the learning experience for graduate students and surpassing traditional advising requirements.

Dr. Elmquist has continued to serve the scientific community in the following capacities:

- Board of Scientific Counselors – NINDS –2019
- External advisory committee for the NINDS - 2020-2021
- Faculty advisor and Host for GPEN 2021 Globalization of Pharmaceutics Education Network
- Chair, Barriers of the CNS Gordon Research Conference (now 2022)

He has also given the following invited presentations:

- *Physiological factors influencing drug distribution in the CNS.* Forbeck Foundation, Lake Geneva, WI
- *BBB Transporters – Drug Delivery to Brain Tumors.* SCIDOT-SNO-2019, Therapeutic Delivery to the CNS, Phoenix, AZ
- *Examining the Determinants of Anticancer Drug Permeability in the Blood-Brain Barrier.* GBM Drug Development Summit, Boston MA
- *BBB Transporters – Drug Delivery to Brain Tumors.* Neuro-oncology Boot Camp: Therapeutic Delivery to the CNS, University of Minnesota, Minneapolis MN
- *Optimizing the Use of Antibody-Drug Conjugates for Brain Tumors (and Miscellaneous Musings).* BBV-2020, Brain Barriers Virtual, Hosted by University of Kentucky
- *Factors influencing drug transport at the BBB: A critical determinant of efficacy in brain tumors.* Ivy Research Foundation, Phoenix, AZ.

Associate Dean and Professor Carolyn A. Fairbanks



Professor Carolyn Fairbanks is in her third year as Associate Dean for Research for the College of Pharmacy and, as of August 2020, is now also the Associate Dean of Graduate Education for the College of Pharmacy. She was elected to serve as Chair of the Council of Research Associate Deans of the University of Minnesota and she represents the CoP to the Graduate Education Committee. She also serves on the Opioid Advisory Task Force of the University of Minnesota and co-leads the U of M Pain Consortium (pain.umn.edu) which is supported by a generous gift from the Hubbard Broadcasting Foundation which is matched with support from the Office of the Vice-President for Research, the Office of Academic Clinical Affairs, and the Medical Discovery Team on Addiction.

In 2020 she continued her service to the Somatosensory and Pain Systems (SPS) Study Section which reviews research applications on pain, analgesia and somatosensory systems in animals and humans. She also reviews grant applications for the Blueprint Neurotherapeutics Network (BPN): Small Molecule Drug Discovery and Development for Disorders of the Nervous System initiative. In Winter 2020, Dr. Fairbanks was elected the Chair-Elect of the Neuropharmacology Division of the American Society of Pharmacology and Experimental Therapeutics.

Dr. Fairbanks was an invited speaker for the Gil Center for Biomolecular Sciences at Indiana University Bloomington. Her talk was entitled, "Impact of Agmatine-Based Therapeutics on Opioid Pharmacology and Chronic Pain."

In 2020 Dr. Fairbanks and her team have implemented the award that she and her colleague George Wilcox (Co - Investigator, Department of Neuroscience) received in 2019, a \$4.5 million grant from the Department of Defense Congressionally Directed Medical Research Program for their project, titled Therapeutic Development of Non-Opioid Strategically Substituted Agmatines for Chronic Pain Management. This program arises from their long-term collaboration with Herb Nagasawa (adjunct professor, Center for Drug Design) and the efforts of pharmacology team members Dr. Cristina Peterson and Kelley Kitto (Department of Neuroscience). The program has been facilitated with contributions by Gunda Georg (Department of Medicinal Chemistry and the Institute for Therapeutics Discovery and Development) and Sudhakar Jakkraj (Institute for Therapeutics Discovery and Development). The Department of Defense application was enabled by the additional supportive efforts of Dr. Cory Goracke-Postle and Dr. Becca Cuellar of the Office of the Associate Dean for Research and the University of Minnesota Pain Consortium. The Institute for Therapeutics Discovery and Development (Vadim Gurvich) and the Center for Translational Medicine (Robert Schumacher and Beverly Norris) are contributing importantly in the implementation of the program. Support for the preliminary data that led to the newly awarded program was provided by an Academic Health Center Faculty Development Award, a gift from the Noble Family to the College of Pharmacy, a MNReach Cycle 5 award, and a previous Department of Defense Congressionally Directed Medical Research Program award.

A major part of Associate Dean Fairbanks's work during 2020 has involved addressing risks associated with COVID-19 as it relates to the College's research mission. She has guided the College of Pharmacy's response through three phases: hibernation resulting from the Governor's shelter-in-place order, planning for resumption of research and maintenance of best practices during the sunrise research period of ongoing but somewhat altered operations. Dr. Fairbanks meets weekly with the Associate Deans to share matters associated with and arising from COVID-19. Dr. Fairbanks attributes our ability to continue operations during the pandemic to the resilience of the research community and how quickly individuals embraced the new safety practices.

2021 holds great promise for a bright future for our research enterprise!

Professor Karunya Kandimalla



Dr. Karunya Kandimalla was interviewed by Allen Saakyan of the YouTube series “Simulation” on the connections between metabolic syndrome, including cardiovascular diseases and diabetes, and Alzheimer’s disease. You can view the interview at z.umn.edu/Simulation367.

Dr. Kandimalla’s lab continues to focus on developing experimental methods and models to elucidate macromolecular transport at the blood-brain-barrier (BBB). In collaboration with Dr. Ling Li (Experimental and Clinical Pharmacology, UMN), the Kandimalla Lab has been investigating the efficacy of HDL mimetics as potential therapeutic agents for Alzheimer’s disease (AD); with Drs. Val Lowe, Ronald Petersen, and David Knopman (Mayo Clinic, Rochester, MN), the Kandimalla Lab has been investigating insulin trafficking deficiencies at the BBB in AD patients and elderly individuals; and with Dr. Krishna Kalari (Mayo Clinic, Rochester, MN), they are developing ‘omics’ approaches to investigate pathophysiological mechanisms contributing to BBB dysfunction in AD and cerebrovascular disease.

Dr. Kandimalla has been elected as the senior member-at-large for the Neuroimaging program area at the Alzheimer’s Association. He is also currently researching COVID-19 transmission, current treatment, and future therapeutic strategies.

Professor Hongbo Pang



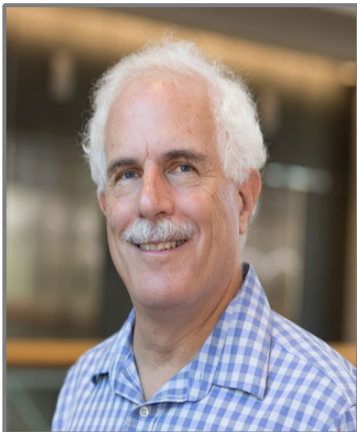
In January, Dr. Hongbo Pang, in collaboration with Dr. David Daniels at Mayo Clinic, was awarded a UMN-Mayo Partnership grant (\$878,000). The aim of this grant is to develop a peptide-guided drug delivery system to improve the therapy against a rare pediatric brain tumor.

Dr. Pang was also invited to serve as an Editorial Board member for *Acta Pharmaceutica Sinica B* and also as an Ad Hoc reviewer for the NIH GDD study section.

Dr. Pang gave presentations to the following groups this past year: The University of Michigan, Sanford Burnham Prebys Medical Discovery Institute, and the University of Minnesota's Prostate Cancer Interest Group, Biomedical Engineering Department, and the MICaB program.

Ying Luo joined Dr. Pang's lab as a part-time R4 researcher in September and Yihan Wang, a graduate student Dr. Pang advises, successfully defended her Master's thesis in November.

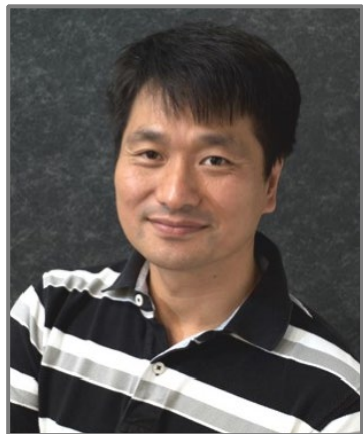
Professor Ronald A. Siegel



Dr. Ronald A. Siegel, elected as Interim Department Head in the Pharmaceutics Department as of February 2020, continues to direct the Biomaterials and Pharmaceutical Materials (BPM) program for Industrial Partners for Research in Interfacial and Materials Engineering (IPRIME) and serves on the advisory board for the Medical Devices Center at the University of Minnesota.

Dr. Siegel traveled to Seoul, South Korea in November 2019, where he presented lectures titled, "*Preclinical Studies of an Intranasal Prodrug/Enzyme Formulation to Treat Seizure Emergencies*" and "*Dynamic Pharmacodynamics*" at 1) the Department of Clinical Pharmacology and Therapeutics, ASAN Medical Center, 2) GC Pharma, and 3) Seoul National University. He extends his gratitude to Jee Eun Lee for arranging the visit.

Professor Changquan Calvin Sun



Based on a publicly available database of 100,000 top-scientists, Dr. Changquan Calvin Sun's world ranking in the field of Pharmacology and Pharmacy is #18 for 2019 impact and #241 for career-long impact in the fields.

Editorial services

- Invited to join Editorial Advisory Boards of *Pharmaceutical Research*, and *Molecular Pharmaceutics*
- 09/2020 – present, Guest Editor, “Mechanical properties of crystals” themed issue, *CrystEngComm*
- 08/2020 – present, Guest Editor, “Pharmaceutical Crystals” themed issue, *Crystals*

Professional committees

- 07/2020 – 10/2020, Member, Organizing committee of the 2nd International Online Conference on Crystals (10-20 November, 2020), Sciforum (online)
- 08/2020 – 07/2025, Physical Analysis Expert Committee, United State Pharmacopeia (**USP**)
- 05/2020 – 06/2021, Session Chair, Crystals in Nature and Medicine, 25th International Conference on the Chemistry of the Organic Solid State (ICCOSS XXV)
- 06/2020, member, PhRMA Foundation, Grant Review Committee
- 07/01/2020 – 06/30/2023, member, China Center Advisory Council, University of Minnesota

Invited presentations

1. **September 24, 2020**, API engineering to enable continuous manufacturing of tablets by direct compression, Chicagoland Pharmaceutical Sciences Discussion Group meeting, Chicago
2. **August 6, 2020**, Spherical crystallization, IPRIME Annual Meeting 2020, University of Minnesota
3. **June 17, 2020**, The Role of Mechanical Properties of Drugs on Tableting Performance – Mechanism and Engineering, Workshop on “Fundamentals of Solid Formulation”, XtalPi (via Zoom)
4. **June 1, 2020**, Structural origins of distinct mechanical flexibility of pharmaceutical crystals, Tianjin University, Tianjin, China (via Zoom)
5. **May 28, 2020**, G. Vreeman, C.C. Wang, C.M. Reddy, **C.C. Sun**, Can We Make Tablets from Elastic Crystals? Virtual Symposium on Solid-State Organic Chemistry (**invited**)
6. **February 19, 2020**, Enabling continuous manufacturing of tablets through API particle engineering, APV 2nd Continuous Manufacturing, Germany
7. **January 7, 2020**, Pharmaceutical Materials Science & Engineering Research in Review – 2019, China Pharmaceutical University, Nanjing, China
8. **January 4, 2020**, 1st David Grant Symposium of Young Investigators, 2019 Pharmaceutical Materials Science & Engineering Research in Review, Minjiang University, Fuzhou, China

9. **January 4, 2020**, Structural Insights Into the Mechanical Properties of Soft Pharmaceutical Crystals, Keynote, 1st David Grant Symposium of Young Investigators, Minjiang University, Fuzhou, China
10. **January 3, 2020**, Structural Insights Into the Mechanical Properties of Soft Pharmaceutical Crystals, Jinan University, Guangzhou, Guangdong, China
11. **January 2, 2020**, Sweet Pharmaceutical Crystals, Southern Medical University, Guangzhou, Guangdong, China
12. **January 2, 2020**, Pharmaceutical Applications of Integrated Crystal and Particle Engineering, Sun Yat-sen University, Guangzhou, Guangdong, China
13. **December 30, 2019**, Punch Sticking – mechanism, kinetics, influencing factors, and engineering solutions, Shenyang Pharmaceutical University, Shenyang, China
14. **December 30, 2019**, Powder Flow – Fundamental & Practical Aspects, Shenyang Pharmaceutical University, Shenyang, China
15. **December 26, 2019**, Integrated Crystal and Particle Engineering for Expedited Development of Tablets, Zhejiang University of Technology, Hangzhou, China
16. **December 25, 2019**, Integrated Crystal and Particle Engineering for Expedited Development of Tablets, Zhejiang University, Hangzhou, China
17. **December 24, 2019**, Solving Tablet Formulation Problems through Integrated Crystal and Particle Engineering, Fudan University, Shanghai, China
18. **December 24, 2019**, Integrated Crystal and Particle Engineering for Expedited Development of Tablets, BociMed Pharmaceutical Co., Ltd., Shanghai, China
19. **December 23, 2019**, Integrated Crystal and Particle Engineering for Expedited Development of Tablets, Shanghai University of Engineering Science, Shanghai, China
20. **December 11, 2019**, Assessing Dissolution of Oral Tablets Using an Artificial Stomach Duodenum Apparatus, Advancements in In-vitro Performance Testing of Drug Products, USP Meetings Center, Rockville, MD

Professor Raj Suryanarayanan



Dr. Raj (Sury) Suryanarayanan's lab continues to apply principles of pharmaceutical materials science to the design of robust pharmaceutical dosage forms with reproducible and predictable properties.

This year, Dr. Sury served as a member of the 2019 Advanced Photon Source (APS) Structural Sciences Proposal Review Panel. He continues to serve as the founding Co-Director for the University of Minnesota of the National Institute for Pharmaceutical Technology & Education (NIPTE) Center of Excellence for Pharmaceutical Education and Certification, and a member of the NIPTE Faculty Committee and the Curriculum and Certification Committee. Dr. Sury is also the University of Minnesota Center Director for the Center for Pharmaceutical Processing Research (CPPR).

In addition, Dr. Sury is a member of the International Pharmaceutical Excipients Council (IPEC) Foundation Scientific Advisory and Awards Selection Committees.

Finally, he is an Associate Editor for *Molecular Pharmaceutics*, published by the American Chemical Society.

Dr. Sury and his research group were invited to give the following presentations this past year:

- “The role of excipients in drug delivery”, presented at PHARMATECH 2020 - Exploring myriads of Pharma in Pharmaceutics and Pharmaceutical Technology, sponsored by AICTE and GUJCOST-DST, October 28, 2020 (online).
- “Stabilization of Amorphous Drugs By Polymers: Effects of Polymer Molecular Weight and Drug/Polymer Interactions” (with A. Sahoo and R. Siegel [Presenter]), IPRIME Fall Meeting, August 6, 2020, University of Minnesota, Minneapolis, MN.
- “Excipient Phase Transformations in Frozen and Freeze-dried Systems and Implications for Protein Stability” (with J. Sonje, S. Thakral, and B. Bhatnagar), IPRIME Fall Meeting, August 6, 2020, University of Minnesota, Minneapolis, MN.

Patent

G. Beilman, A. Wolf, R. Suryanarayanan, S. Thakral, *Resuscitation composition and methods of making and using*. US Patent Number 10,307,398 B2, June 2019.

Professor Timothy Wiedmann



Dr. Wiedmann continues to participate in AeroCore, an internal/external research organization at the University of Minnesota that conducts inhalation research studies. AeroCore is currently supporting a project with Dr. Stephen Hecht, *e-Cigarettes: Formaldehyde DNA Adducts, Oxidative Damage, and Potential Toxicity and Carcinogenesis*. Research with Dr. Natalia Tretyakova (Medicinal Chemistry, U of M) continues, which involves rodent exposure to cigarette smoke and measurement of the formation of DNA adducts.

A rewarding funded project was completed, in which the distribution of lung surfactant was determined following administration to newborn, surfactant-deficient lambs using a novel aerosol generation device (PI: Dr. Amir Naqwi, Abbe Vision), and a new proposal was funded, *Tools for Improved Translation of Novel Inhalable Therapeutics* (PI: Dr. Amir Naqwi).

Dr. Wiedmann continues his phase retirement, which is planned to extend for an additional two years. This year, Dr. Wiedmann served as co-adviser to Anqi Lu, who graduated with her Pharmaceutics MS degree 2020, and currently co-advises the following MS students: Zijian Wang (Pharmaceutics), Chenxu Li (Pharmaceutics), Fangyi Dong (Pharmaceutics), and Stephanie Eilts (Mechanical Engineering).

Dr. Wiedmann also accepted the following professional collaborations:

PDIC Roberts (PI)

- *Preclinical Evaluation and Advancement of an Intra-Laryngeal Sprayer for Exogenous Surfactant Delivery to Preterm Neonates*. Purpose: Conduct biodistribution studies of lung surfactant administered to preterm lambs. Role: Co-Investigator

NIH Tretyakova (PI)

- *Smoking-Induced Epigenetic Changes in the Lung; Role of DNA Demethylation*. Purpose: Expose mice to cigarette smoke under controlled conditions. Role: Consultant

Recent Publications

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