University of Minnesota Department of Pharmaceutics Fall 2017

Indispensable News
MinneCeutics

From the Department Head

Greetings Dear Friends!

Allow me to take a moment to thank you. With all the demands on your time, especially as we delve into a new semester and other adventures, you still chose to read this newsletter. For choosing to stay engaged, which allows us to grow and explore together, I thank you.

While every new academic year is unique, this year is special in that we admitted arguably the largest class of graduate students in our history. Comprised of five PhD and six MS students, this new class brings us promising talent and diverse experience from around the world. You can read more about them on page 6.

We are also excited to welcome our newest department faculty member, Dr. Hongbo Pang, who joins us from Sanford Burnham Prebys Medical Discovery Institute. To read more about his background and research interests, see page 26.

Yet, as we welcome new members, we must bid farewell to others. This year, Dean Marilyn Speedie stepped down after twenty years of outstanding leadership, leaving behind a legacy of accomplishment. Under her leadership, the College of Pharmacy expanded to Duluth, Minnesota, increased its research funding, broadened its scope of impact, and captured the #2 ranking in the US News & World Report.

Hoping to continue that legacy is Dr. Lynda Welage, who we welcomed as our new dean in August. Prior to joining us, she was dean of the College of Pharmacy at the University of New Mexico. Considered a national expert on critical care and drug absorption, Dean Welage has also researched, published, and presented extensively on issues related to alterations in intestinal transport processes during acute inflammatory states. With someone so capable at the helm, we eagerly anticipate her vision for our college and all that we may achieve together. To read more about her background, see page 15.

After all, achievement is something we value. Our graduate students, who have a long history of winning prestigious national awards, performed exceptionally well again this year and a number of them will be receiving awards at the 2017 American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition. To congratulate them, or just to mingle, please join us at our Minnesota Alumni Breakfast on November 13 at 7:00 AM at the San Diego Marriott Marquis and Marina. Our featured speaker this year is Dr. Mohsen Abdel-Fattah Hedaya, a Pharmaceutics alumnus who earned his PhD in 1989. He will be sharing his life story and insights.

As always, I welcome your feedback on any department activity and hope to see many of you at various professional meetings soon. If you plan to be in the Twin Cities, please stop by for a visit!

Until then,

Jayanth Panyam, PhD
Professor and Department Head

Alumni News

Alex Grill and Zelda

Suneel Rastogi and family

Aditya and big sister, Veda

Left to Right: Ramola Sane, PhD [2012], Shruthi Vaidhyanathan, PhD [2015], Karen Parrish, PhD [2016], and Nidhi Sharda, PhD [2016], at Bristol-Myers Squibb, New Jersey

Alexander Grill, PhD [2012], welcomed a beautiful baby girl, Zelda Lucille, in September 2017.

Ameya Kirtane, PhD [2015], was designated the winner of the University of Minnesota Graduate School's "Best Dissertation Award" in the Biological and Medical Sciences for 2017.

Ameya married Dr. Eileen Huttlin on June 24, 2017 in Roseville, Minnesota. Eileen is a native of Fargo, North Dakota and a long-time Gopher; she completed both her undergraduate degree in psychology and medical degree at the University of Minnesota. She is currently a physician resident in the Adult Psychiatry Program at the Cambridge Health Alliance in Cambridge, Massachusetts.

Suneel Rastogi, PhD [2000], recently joined Leading Pharma as Senior Director and Head of Research and Development. Leading Pharma is a small but rapidly growing pharmaceutical company located in New Jersey. As Head of Research and Development, Suneel is responsible for overall strategy and execution of product development.

Nidhi Sharda, PhD [2016], received the 2017 American Association of Pharmaceutical Scientists (AAPS) Graduate Student Research Award in Pharmacokinetics, Pharmacodynamics, and Drug Metabolism (PPDM) and Clinical Pharmacology and Translational Research (CPTR). This award is designed to recognize excellence in graduate education in these fields. She has been invited to present a poster and give a talk at the 2017 AAPS Annual Meeting and Exposition titled *Kinetics of Amyloid Beta Proteins Traffic at the Blood-Brain Barrier in Alzheimer's Disease*.

Nidhi is currently working as a research investigator in the Metabolism and Pharmacokinetics (MAP) department at Bristol-Myers Squibb, New Jersey.

Shruthi Vaidhyanathan, PhD [2015], welcomed her second child, a beautiful boy named Aditya Jayaram Sai, in October 2017.

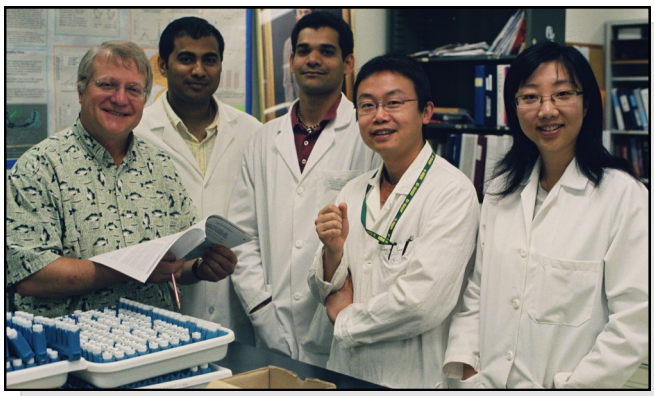
Send your alumni news and pictures to pceuts@umn.edu!

Alumni News

A Blast from the Past!

Do you recognize the any of the alumni and friends in the pictures below? Email your answers to pceuts@umn.edu!

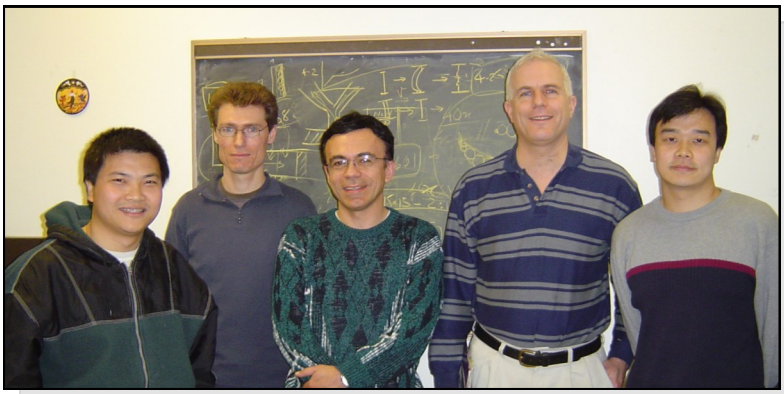
1. 

2. 

3. 

4. 

5. 

6. 

From the Director of Graduate Studies

Dear Friends and Colleagues,

The past year was exciting with great progress in our graduate program on almost every front. As I begin my third year, I continue to learn in my role as the Director of Graduate Studies (DGS). I find enormous pleasure in serving the department faculty, students, and the College of Pharmacy.

This year, we had an exceptionally high number of strong domestic applicants. This allowed us to bring these candidates into our department for a day-long visit. The scheduling was complicated, but the event unfolded seamlessly. Each candidate spoke with three different faculty members and toured the campus, research centers, and the college. Katie James's assistance was invaluable in organizing the interview day, and our own graduate students enthusiastically supported the effort. The matriculation rate was high, and so we look to repeat our success.

At the university and collegiate level, there is once again great interest in increasing the number of domestic students in our program. We plan to start a summer research program to engage domestic students early in their undergraduate degree program. With this time frame, they will be well prepared for conducting research when starting graduate school. The success of this program can be gauged only after four to six years, and it will require sustained financial support. I seek your help to make this program a success. If you want to support us, visit z.umn.edu/give-pceutics and give.

We also participated in the Life Sciences Graduate School Fair held at the University of Minnesota. Nearly twenty undergraduate students interested in pursuing a graduate degree inquired about our program. This will certainly help us with recruiting more domestic students.

Dean Lynda Welage met with our department faculty soon after she started her deanship at our college. She was open to new ideas for improving the procedures and research support that her office can provide. We look forward to working with her to enhance teaching and research in the college.

On the student front, we graduated four PhD and two MS students in the past year. Both of our MS graduates successfully matriculated to our PhD program. This year, we also welcomed five PhD and six MS students. This is the largest cohort by far in the recent history of our department. This has brought the current size of our program to 34 students (27 PhD and 7 MS), again nearly a historical high. As mentioned in Professor Panyam's greeting, our students continue to win awards and the research publication rate is again outstanding. This is a reflection of the excellence of the student research, which requires creativity and tremendous effort.

Finally, we recently started a means to better publicize all the great work and news in the department using social media. Now our department is on LinkedIn, Twitter, and Facebook. Make sure you follow us and comment on our updates. We need your participation to maximize the benefit. These social media platforms will be excellent venues for keeping you and the department closely connected. We are eager to hear from you; please come see me at the Minnesota Alumni Breakfast and let me know your thoughts.

Sincerely,

Changquan Calvin Sun, PhD

Professor and Director of Graduate Studies

Graduate Student News

Front Row (Left to Right): Janice Laramy, Michelle Fung, Wei-Jhe Sun, Surabhi Talele, Dr. Esam El-fakahany
Back Row (Left to Right): Dr. Raj Suryanarayanan, Dr. Ronald Siegel, Dr. William Elmquist, Dr. Karunya Kandimalla, Dr. Jayanth Panyam, Dean Marilyn Speedie

Degrees Earned in 2016-2017

Michelle Fung, PhD
Thesis: *Effects of Additives on Molecular Mobility, Physical Stability, and Dissolution of Amorphous Solid Dispersions*
Advisor: Dr. Raj Suryanarayanan

Krutika Harish Jain, MS
Thesis: *Biodegradable, Liquid-Filled Spherical Capsules with Pre-Determined Burst Times*
Advisor: Dr. Ronald Siegel

Janice Laramy, PhD
Thesis: *Permeability, Binding, and Distributional Kinetics of Ponatinib, a Multi-Kinase Inhibitor: Implications for the Treatment of Brain Tumors*
Advisor: Dr. William Elmquist

Vidur Sarma, PhD
Thesis: *Insulin Trafficking Perturbations at the Blood-Brain Barrier in Alzheimer's Disease Models*
Advisor: Dr. Karunya Kandimalla

Wei-Jhe Sun, PhD
Thesis: *Particle Engineering for Formulation Development*
Advisor: Dr. Changquan Calvin Sun

Surabhi Talele, MS
Thesis: *Development of Antibody Conjugated Nanoparticles for Targeting Cerebrovascular Amyloid Deposits*
Advisor: Dr. Karunya Kandimalla

2016-2017 Graduate Fellowship Recipients

The ***David J.W. Grant and Marilyn J. Grant Fellowship in Physical Pharmacy*** is awarded to students whose research is focused in physical pharmacy. **Shao-Yu Chang** (Advisor: Dr. Changquan Calvin Sun) was this year's recipient.

The ***Edward G. Rippie Fellowship in Pharmaceutics*** is awarded to students with a consistent and outstanding academic record. It was awarded to **Janice Laramy** (Advisor: Dr. William Elmquist) this year.

The ***Ronald J. Sawchuk Fellowship in Pharmacokinetics*** is awarded to a graduate student whose research is focused in pharmacokinetics. **Gautham Gampa** (Advisor: Dr. William Elmquist) received this year's award.

The ***Theodore H. Rowell Graduate Fellowship*** is awarded to graduate students who have completed at least two years of study in a pharmaceutical sciences program with preference given to students interested in nutrition or drug delivery systems. The recipients this year were **Hyunjoon Kim** (Advisor: Dr. Jayanth Panyam) and **Davin Rautiola** (Advisor: Dr. Ronald Siegel).

The ***American Foundation for Pharmaceutical Education (AFPE) Pre-Doctoral Fellowship in Pharmaceutical Sciences*** is awarded to students who possess the skill and aptitude to become outstanding scientists and leaders. This year **Janice Laramy** (Advisor: Dr. William Elmquist) and **Davin Rautiola** (Advisor: Dr. Ronald Siegel) received this award.

Graduate Student News (cont.)

Welcome New Students!

Benjamin Clements
PhD Advisor: Dr. Carolyn Fairbanks
- BS in Chemistry, University of North Carolina-Chapel Hill
- BS in Biology, University of North Carolina-Chapel Hill

Jessica Griffith
PhD Advisor: Dr. William Elmquist
- BS in Biology, West Virginia University
- BA in Religious Studies, West Virginia University

Xueyao Hu
MS Advisor: Dr. Ronald Siegel
- BS in Biomedical Engineering, Shenyang Pharmaceutical University

Sibo Liu
MS Advisor: Dr. Changquan Calvin Sun
- BS in Pharmacy, Sun Yat-Sen University School of Pharmaceutical Science

Zhongyang Shi
MS Advisor: Dr. Changquan Calvin Sun
- BS in Pharmacy, China Pharmaceutical University

Jayesh Sonje
MS Advisor: Dr. Raj Suryanarayanan
- MS in Pharmaceutical Chemistry, New Jersey Institute of Technology
- BS in Pharmaceutical Sciences, Bharti Vidyapeeth College of Pharmacy

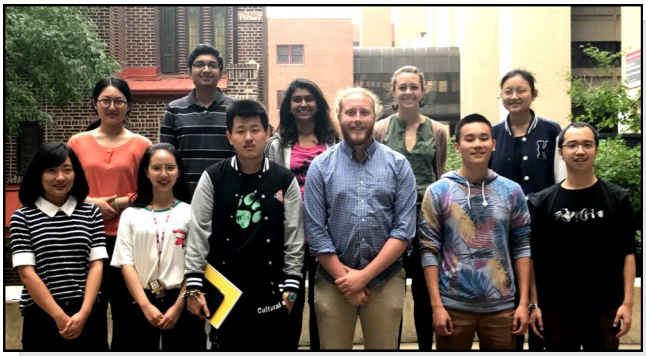
Surabhi Talele
PhD Advisor: Dr. William Elmquist
- MS in Pharmaceutics, University of Minnesota-Twin Cities
- BTech in Pharmaceutical Sciences and Technology, Institute of Chemical Technology, Mumbai

Lushan Wang
MS Advisor: Dr. Karunya Kandimalla
- BS in Traditional Chinese Medicine, Shenyang Pharmaceutical University

Jiawei Wang
MS Advisor: Dr. Jayanth Panyam
- BS in Pharmacy, Sichuan University

Wenqiu Zhang
PhD Advisor: Dr. Jayanth Panyam
- MSc in Pharmaceutical Formulation and Entrepreneurship, University College London
- BS in Pharmaceutical Sciences, Sichuan University

Andrew Zhou
PhD Advisor: Dr. Karunya Kandimalla
- BS in Biochemistry, University of Minnesota-Twin Cities



Front Row (Left to Right): Xueyao Hu, Lushan Wang, Sibo Liu, Benjamin Clements, Andrew Zhou, Zhongyang Shi
Back Row (Left to Right): Jiawei Wang, Jayesh Sonje, Surabhi Talele, Jessica Griffith, Wenqiu Zhang

Graduate Student Activities

Shao-yu Chang completed a summer internship at Abbvie in Waukegan, Illinois. His work focused on the development of an active pharmaceutical ingredient (API) multiscale characterization platform to provide systematic assessment of API attributes and the establishment of a template for crystallization kinetics assessment for easy use and comprehensive data discussion.

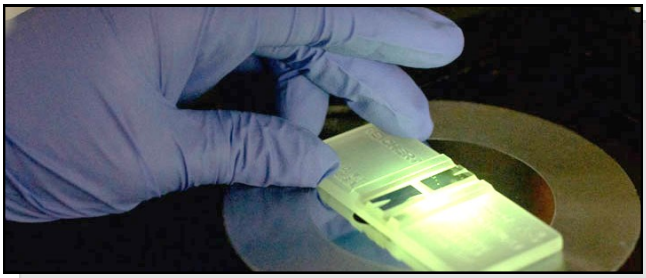
Jiangnan Dun completed a summer internship at Amgen in the Small Molecule Pharmaceutics department. His research included characterizing excipients, drugs, and formulations using a state-of-the-art compaction simulator.

Gautham Gampa presented his research titled *Improving the Delivery of Small Molecule Targeted Therapies for the Treatment of Brain Tumors* at the 2016 Globalization of Pharmaceutics Education Network (GPEN) Annual Meeting held in Lawrence, Kansas and at the 23rd Annual Blood-Brain Barrier Meeting held in Stevenson, Washington.

Gautham also represented the University of Minnesota Table Tennis team at the 2017 College Table Tennis National Championships held in Eau Claire, Wisconsin.

Krutika Harish Jain successfully defended her MS thesis and is now a PhD student in Professor Siegel's lab.

Navpreet Kaur has begun her second year as a PhD student working under the supervision of Professor Suryanarayanan. Her research group specializes in material science of pharmaceutical solids with an emphasis on solid form characterization. She recently interned with the Material and Analytical Sciences group at Boehringer-Ingelheim in Ridgefield, Connecticut. Her extracurricular interests include reading, painting, and singing.



Vidhi Khanna completed a summer internship in the Analytical Sciences department at Seattle Genetics in Seattle, Washington. The Chinese Hamster Ovary (CHO) cell line is used for the production of all Seattle Genetics antibody components and during production one of the main impurities observed at various steps are CHO host cell proteins (HCP). Vidhi worked on developing and qualifying an analytical method for the quantification of these HCPs.

Minjee Kim has received several travel scholarship awards for her research over the last year. She gave oral presentations at the Blood-Brain Barrier (BBB) Consortium, Brain Tumor Program (BTP), and 2017 Physical Sciences - Oncology Network (PS-ON) Annual Investigators Meeting at the Koch Institute for Integrative Cancer Research at MIT. In total, she had 14 research posters at local and international conferences in 2016-2017.

Minjee completed a summer internship at Genentech, Inc. in the Drug Metabolism and Pharmacokinetics department. Her project was an integral part of understanding permeability of small molecule drugs through the development of blood-brain barrier models comprised of primary human brain cells.

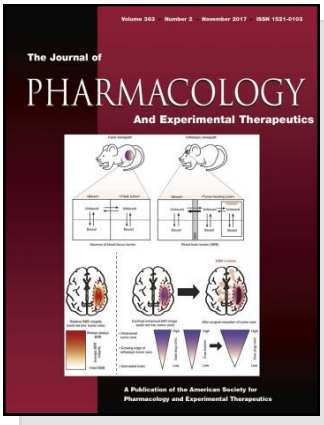
Kweku Konadu received the American Association of Pharmaceutical Scientists (AAPS) 2017 Graduate Student Award in Analysis and Pharmaceutical Quality (APQ) for his project titled *Influence of Drug-Polymer Interactions on the Dissolution Performance of Amorphous Solid Dispersions*. The award will be presented at the annual meeting in San Diego, California this November 2017.

Graduate Student Activities (cont.)

Sampada Koranne received the Outstanding Poster Presentation Award at the Gordon Research Seminar on Preclinical Form and Formulation for Drug Discovery held at the Stoweflake Conference Center in Stowe, Vermont. Her poster presentation was titled *Investigation of Spatial Heterogeneity of Salt Disproportionation in Tablets Using Synchrotron X-ray Diffractometry*.

Sampada also received the International Pharmaceutical Excipients Council (IPEC) Foundation 2017 Graduate Student Award for her dissertation project titled *Mechanistic Insights into Excipient Induced Salt Disproportionation in Multi-Component Pharmaceutical Dosage Forms*. The award will be presented at the 2017 American Association of Pharmaceutical Scientists (AAPS) Annual Meting and Exposition in San Diego, California this November 2017.

Janice Laramy published two research manuscripts and a figure from one of her articles has been selected as the cover illustration for the November 2017 issue of Journal of Pharmacology and Experimental Therapeutics (JPET). In addition to receiving two fellowships, her awards in 2016-2017 also include the Brain Tumor Program (BTP) Travel Fellowship, Best Teaching Assistant of Semester Award, and World Preclinical Congress Student Fellowship Award. She gave oral presentations at the Brain Tumor Program (BTP) Data Club and the 2017 University of Minnesota/Mayo Neuro-Oncology Retreat. She also gave a poster presentation at the 2017 Physical Sciences-Oncology Network/Consortium Annual Investigator's Meeting at MIT in October 2017 in addition to ten other poster abstracts in 2016-2017.



Davin Rautiola received a Teaching Assistant Recognition Award for his work in the Pharmacokinetics and Pharmacology PharmD courses during the 2016-2017 academic year.

Vidur Sarma received the 2017 American Association of Pharmaceutical Scientists (AAPS) Graduate Student Award in Pharmacokinetics, Pharmacodynamics, and Drug Metabolism (PPDM) and Clinical Pharmacology and Translational Research (CPTR) for his thesis project titled *The Impairment of Insulin Transport Processes at the Blood-Brain Barrier in Alzheimer's Disease*. The award will be presented at the annual meeting in San Diego, California this November 2017.

Graduate Student Activities (cont.)

50th PGSRM
Bridging Therapeutics and Technology

PGSRM is coming to the U of M!

We are excited to announce that the Department of Pharmaceutics will be hosting the Pharmaceutics Graduate Student Research Meeting (PGSRM) in June 2018. The theme for the **50th Annual Meeting** is "Bridging Therapeutics and Technology." PGSRM is a wonderful opportunity for students from 20 leading Midwest universities to network and share their research interests. We look forward to hosting a captivating and worthwhile conference with speakers who are leaders in both industry and academia. We hope you will join us in celebrating this exciting milestone event.

CURRENTLY SEEKING FINANCIAL SUPPORT

Please refer to the contact information below to contribute to PGSRM 2018

PGSRM Co-Chairs

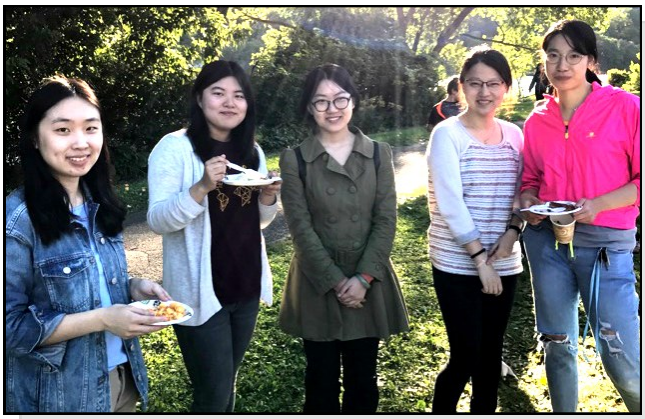
Kelsey Pflepsen
pflep009@umn.edu

Vidhi Khanna
khanna035@umn.edu

Graduate Student Organizations

2017 Fall Picnic Hosted by the 2016-2017 Pharmaceutics Graduate Student Representatives Shenye Hu & Kunlin Wang

Students prepared tasty food for the entire Pharmaceutics department and their families and friends on the banks of the Mississippi River at the East River Flats Park. It was a gorgeous afternoon and everyone had a great time! You can see a short video of the event at youtu.be/QNEUbS4lYHs.





Graduate Student Organizations (cont.)

AAPS Student Chapter News

The AAPS Student Chapter was established at the University of Minnesota in February 2002. Initially, the chapter was composed of a small number of students from the Department of Pharmaceutics. Today, the chapter involves students and post-doctoral fellows from the Departments of Pharmaceutics, Experimental and Clinical Pharmacology, and Medicinal Chemistry.

This year the chapter hosted several professional development seminars covering a wide-range of topics including mentoring, leadership, and job searching as well as co-sponsoring the Rho Chi Research Day. They also hosted social events like a meet-and-greet happy hour, the annual bowling event, and the annual kick-off meeting.

The AAPS Student Chapter is looking forward to presenting a series of professional development seminars with invited speakers as well as social and charity events during the 2017-2018 academic year!

Check out the chapter's Facebook page at facebook.com/AAPSUMN.

AAPS Student Chapter Officers 2017-2018

Chair: **Drishti Sehgal**

Chair-Elect: **Surabhi Talele**

Treasurer: **Jessica Griffith**

Secretary: **Jayesh Sonje**

Social Media Coordinator: **Kunlin Wang**

Student Outreach Officer: **Wenqiu Zhang**

Pharmaceutics Graduate Student Representatives 2017-2018

Hongbo Chen

Yafan Su

Council of Graduate Students (COGS) Pharmaceutics Representative 2017-2018

Kweku Konadu

People

Naga Kiran Duggirala, a post-doctoral associate in Dr. Sury's lab, is currently researching the development of alternative drug deliveries for existing drug products in order to improve safety and efficacy. His broad research interests include formulations, developing oral dosage forms, and drug delivery. As of 2017, Naga has co-authored six publications and was named co-inventor on five patent applications.

Samuel Erb, a post-doctoral associate in Dr. Fairbanks's lab, received a post-doctoral fellowship in the National Institute on Drug Abuse (NIDA) training grant *Neuroscience Training in Drug Abuse Research* which will span the duration of his training.

Robert Foldes earned his PhD in Mathematics from the University of Minnesota-Twin Cities under Professor Siegel's supervision. The title of his dissertation was *Nucleation of Cavities in Gels*.

Yuebin Ge, a professor from South-Central University for Nationalities School of Pharmacy in Wuhan, China, joined Dr. Sun's lab as a visiting scholar in September 2017. She will be working on disintegration aspects of tablet formulation during her one year stay.

Ahmad Hivechi is a visiting Textile Engineering PhD scholar from Amirkabir University of Technology in Tehran, Iran. He is currently working with Professor Siegel on fibrous hydrogel systems based on electrospinning.

Amanda Hokanson, Executive Office and Administrative Specialist, and **Katie James**, Office Supervisor and Graduate Program Coordinator, won a team 2016 College of Pharmacy Meritorious Service Award. The award was presented at the 15th Annual College of Pharmacy Employee Day at the Glensheen Mansion in Duluth, Minnesota in June 2017.

Ceren Karahan is a visiting Genetics and Bioengineering MS scholar from Yeditepe University in Istanbul, Turkey. She is currently working with Professor Siegel on enzyme immobilization for cyclic action of hydrogels.

N.S. Krishna Kumar joined Dr. Sury's lab as a post-doctoral associate. He is currently working on the applications of dielectric spectroscopy in the area of pharmaceutical materials science. Krishna earned his BS in Physics from Kerala University in Kerala, India and his PhD in Physics from Pondicherry University in Puducherry, India. Prior to joining the department, Krishna worked as a research associate in the Solid-State Chemistry division at Indira Gandhi Centre for Atomic Research in Kalpakkam, India. His research work comprises of improving the solubility and physical stability of active pharmaceutical ingredients (API) through amorphous solid dispersion and studying the physical instability of amorphous systems due to molecular mobility using dielectric spectroscopy as a major tool.

People (cont.)

Christina Larson, a second-year Comparative Molecular Biosciences PhD student in the College of Veterinary Medicine and working in Dr. Fairbanks's lab, received a training fellowship in the Office of the Director's National Institutes of Health (NIH) training grant *Comparative Medicine and Pathology*. This award will span the duration of her training.

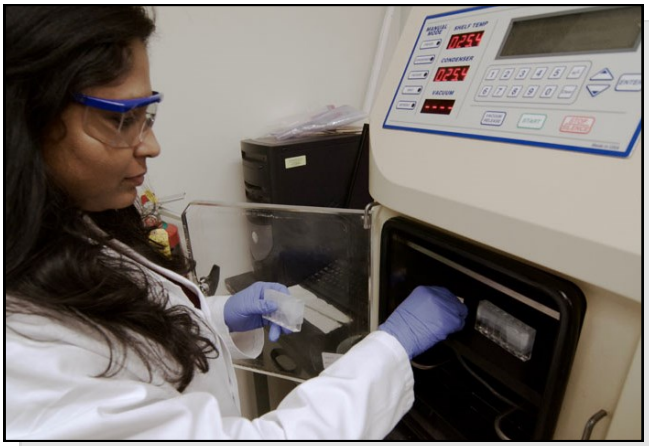
Gopi Krishna Moku joined Dr. Panyam's lab as a post-doctoral associate. He earned his BSc and MSc degrees in Chemistry from Osmania University in Hyderabad, India and completed his PhD thesis work at the Council of Scientific and Industrial Research (CSIR) Indian Institute of Chemical Technology in Hyderabad, India. Gopi's current research work is focused on understanding the effect of fibrinolytic enzymes on the chemotherapeutic activity of anticancer agents in mouse patient-derived xenograft (PDX) models of non-small cell lung cancer (NSCLC), studying cancer stem cell targeted silicate prodrugs for combating tumor recurrence, and developing nano-engineered mesenchymal stem cells loaded with high concentration of anticancer agents as tumor targeted therapeutic carriers.

Siddharthya Mujumdar, a former Biomedical Engineering PhD student in Professor Siegel's lab, is Group Leader in Late Stage Development at Roche in Basel, Switzerland. He is also leading the Continuous Manufacturing initiative within the organization.

Eric Nuxoll, a former post-doctoral associate in Dr. Siegel's lab, has been promoted to Associate Professor of Chemical Engineering at the University of Iowa in Iowa City, Iowa.

Muhammed Safdar is a visiting Pharmaceutics Sciences PhD scholar from Gomal University in Dera Ismail Khan, Pakistan. He is working with Professor Siegel on polymer and hydrogel swelling and rheology.

Anasuya Sahoo joined Dr. Sury's lab as a post-doctoral associate and is being co-advised by Dr. Siegel. She earned her PhD in Polymer, Fibre Science, and Technology from the Indian Institute of Technology (IITD) in Delhi, India and worked as a senior scientist at Aditya Birla Science and Technology Company Private Limited in Mumbai, India before joining the University of Minnesota. She has a rich industrial experience in melt extrusion, electro-spinning/spraying, nano-formulation, and rheology and has seven patents as an inventor. Her current research interests are in amorphous solid dispersion of drugs, hydrogels for drug delivery, and raft polymerization.



Subarna Samanta departed Dr. Sury's lab to join the University of Pennsylvania as a post-doctoral associate.

Seema Thakral, a research scientist in Dr. Sury's lab, delivered the following presentations this past year:

- *Optimization of a Low-Volume Resuscitation Fluid Formulation to Treat Hemorrhagic Shock*. PepTalk: The Protein Science Week: Lyophilization and Emerging Drying Technologies Conference, San Diego, California (January 2017).
- Thakral S, Suryanarayanan R, Koranne S. *Spatial Heterogeneity in Mannitol Phase Composition in Co-Lyophilized Binary Systems*. International Society for Lyophilization and Freeze-Drying Midwest Chapter, Chicago, Illinois (April 2017).
- *Salt Formation During Freeze-Drying: An Approach to Enhance Indomethacin Dissolution*. Physical Pharmacy and Biopharmaceutics Webinar, American Association of Pharmaceutical Scientists (July 2017).

People (cont.)

- *Use of SXRD to Study Spatial Heterogeneity in Mannitol Phase Composition in Co-Lyophilized Binary Systems*. Pharmaceutical Powder X-ray Diffraction Symposium (PPXRD-15), Hyderabad, India (August 2017).

Alpana Thorat joined Dr. Sury's lab as a post-doctoral associate. Alpana earned her BPharm from Pune University in 2006 and MTech in Pharmaceutical Technology (Biotechnology) from the National Institute of Pharmaceutical Education and Research (NIPER) in 2008. She worked in the pharmaceutical industry at Sai Life Sciences in Pune, India for one year in the Absorption, Distribution, Metabolism, and Excretion (ADME) group. In 2010, she joined the Chemical Engineering PhD program at the Indian Institute of Technology. Immediately after earning her PhD, Alpana worked as a post-doctoral research associate in the Department of Industrial and Physical Pharmacy at Purdue University in West Lafayette, Indiana where she worked toward understanding water-solid interactions and delaying moisture mediated crystallization of initially amorphous materials. Her current research focuses on excipient interactions and physicochemical stability. Her research interests include amorphous solid dispersions, particle engineering, process optimization, polymorphism, and lyophilization.

Jody Tracy, Program/Project Specialist, earned her BAS in Communications and Massage Therapy from the University of Minnesota-Crookston in June 2017. She has been certified as a yoga instructor through Yoga Alliance.

Hongliang Wen is a visiting scientist from the Division of Antibiotics and Microbiology at the Shanghai Institute for Food and Drug Control. She joined Dr. Sun's lab this year and will be working on developing a fast method for determining critical water activity for hydrate formation.

Amber Vyas returned to his role as Professor at Pt. Ravishankar Shukla University in Raipur, India after completing his work with Dr. Sury's lab.

Shuangling Zhang, a former post-doctoral associate in Dr. Elmquist's lab, welcomed her second child, a lovely girl named Aijia, in May 2017.

Shenyang University Internship Program

Dr. Wiedmann helped coordinate the internships of six students from Shenyang Pharmaceutical University (SPU), located in Liaoning Province in Northeast China. The students spent the 2017 spring semester in one of five different University of Minnesota College of Pharmacy labs as part of their BS in Pharmacy program requirements. Pictured from left to right:

- **Zhaohui Wang**, Sichuan Province, Suining City
- **Xiang Li**, Shanxi Province, Taiyuan City
- **Lushan Wang**, Zhejiang Province, Zhoushan City
- **Yifu Lyu**, Henan Province, Zhumadian City
- **Xueyao Hu**, Tianjin Province, Tianjin City
- **Tengfei Lyu**, Henan Province, Zhumadian City

The college is looking forward to welcoming six new SPU interns this spring 2018!

People (cont.)

Welcome Dean Lynda Welage

In July 2017, the College of Pharmacy welcomed our new dean, Dr. Lynda Welage. Dr. Welage brings extensive experience as a collaborative academic leader and an accomplished translational researcher, educator, and pharmacy practitioner. She was dean of the College of Pharmacy at the University of New Mexico in Albuquerque, New Mexico where she was also professor of pharmacy practice and administrative sciences. Prior to that, she was a professor, clinical pharmacist, and associate dean for academic affairs at the University of Michigan in Ann Arbor, Michigan. Her varied leadership roles at University of Michigan included service as associate director of the Michigan Institute for Clinical and Health Research.

Dr. Welage earned her PharmD from the State University of New York at Buffalo Division of Clinical Pharmacy in Buffalo, New York and BS in Pharmacy from the University of Michigan College of Pharmacy in Ann Arbor, Michigan. A nationally known expert on critical care and drug absorption, she has researched, published, and presented extensively on issues related to alterations in intestinal transport processes during acute inflammatory states.

Dr. Welage is on the American College of Clinical Pharmacy Board of Trustees, a member of the American Association of Colleges of Pharmacy Council of Deans' Task Force on Population Health, a fellow of the American College of Clinical Pharmacy, and has held many other leadership roles in local, state, and national pharmacy and medical organizations.

As dean, Dr. Welage will be chief executive officer and chief academic officer of the University of Minnesota College of Pharmacy on both the Twin Cities and Duluth campuses, provide strategic and intellectual leadership and administrative oversight for the college, and collaborate with other campus deans to advance the university's collective mission.

Source: pharmacy.umn.edu/news-and-events/lynda-s-welage-pharmd-fccp-named-dean-college-pharmacy

In Memoriam

Dr. Rajesh Omtri

We are deeply saddened by the passing of Dr. Rajesh Omtri on October 11, 2017 after a long and brave battle with cancer. Rajesh worked with Dr. Kandimalla for the past nine years. He is survived by his wife, two sons, his parents, two brothers and sisters-in-law, nieces and a nephew, and many other relatives and friends.

Rajesh was born in Chitoor, Andhra Pradesh, India on July 14, 1977. He is the beloved youngest son in the family with two older brothers. He was a very popular kid in the neighborhood and grew up to be a fine young man who would never give up on his family and friends.

Rajesh had very fond memories of the time he spent in college as an undergraduate student. He was a fearless student who never hesitated to speak his mind. He started exhibiting his leadership skills by actively participating in community service and serving as an under-officer in the national cadet corps. The bonds of friendship he made during his college days stayed strong.

Rajesh was always willing to help people around him. He once saved a friend from a life threatening accident. According to Rajesh, this was the most satisfying act in his life.

Rajesh held a great interest in the sciences and pursued training as a pharmaceutical scientist. In the US, he tenaciously conducted cutting-edge research on developing methods for the early diagnosis and treatment of Alzheimer's disease. He contributed not only through his own original research, but also through the support he provided to graduate students in the lab. His work was instrumental in the successful completion of two PhDs from the University of Minnesota. While working full-time in the lab and taking care of his young family, he also pursued his third PhD and successfully defended his thesis. That same year he was diagnosed with stage 4 colon cancer, which he fought with exemplary courage and a positive attitude.

Rajesh believed that the "Director" had chosen him to play the challenging role because he alone could handle it well!

Rajesh will be remembered for his consistently positive attitude, giving spirit, humility, and amazing intellect and will be greatly missed by all those who were fortunate enough to have him in their lives.

Campaign Updates

Thank you advance phase donors!

The College of Pharmacy has already reached $21 million of its $30 million campaign goal, with the public phase of our campaign yet to come. Our gift support has increased three-fold since the last campaign thanks to donors like you! The University of Minnesota is also making significant progress toward its overall campaign goal of $4 billion with $2.5 billion having already been raised. This spring 2018 we will be launching our public phase to coincide with the college's 125th anniversary. Look for your invitation to our campus campaign events as well as a regional event near you.

Our college's strengths in pharmacy practice and pharmaceutical sciences play a central role in four of the five University of Minnesota campaign priorities. Moreover, we contribute substantially to the university's advancement of health via our discoveries in medicine and training the next generation of patient-care clinicians. We're also at the forefront of the university as an economic engine for the state as the top patent-revenue producer. Additionally, our leadership in addressing health disparities is integral to the university's mission to help create a society where the rising tide lifts all the boats, not just the yachts. Finally, our top-tier US News & World Report ranking demonstrates our commitment to act as a pacesetter in ensuring a world-class educational experience for each student.

The College of Pharmacy's campaign priorities reflect the input we received from you during our extensive strategic planning process. In the Pharmaceutics department, funding our field-shaping scientists, who are at the very core of our signature programs, through sponsored professorships remains a top priority. Fellowship funding is also a top priority as we continue to attract the best and brightest graduate students worldwide.

We would like to take this moment to ask you to consider making a special, lasting gift reflecting your University of Minnesota Pharmaceutics education and professional career. You can give to an existing Pharmaceutics fellowship fund (e.g. Grant, Sawchuk, Rippie, etc.) or establish a fund in your own name. No matter how you give, you'll make a positive impact on our top graduate students. Fellowships, created and sustained by donors like you, give students the ability to join the University of Minnesota's Pharmaceutics graduate program and attend special conferences or other academic enrichment programs that would otherwise not have been possible. If you wish, you can elect to receive annual updates from your sponsored graduate student which is a wonderful opportunity to stay connected.

Fellowship support is one of the most effective ways to advance pharmaceutics, as evidenced by 70% of our own faculty designating gifts for fellowships. By supporting an existing fellowship or creating a new one, you'll make a huge difference to graduate students each year, plus help ensure the Pharmaceutics department maintains its competitive recruiting advantage and keeps our college at the top.

In closing, I would like to again thank our advance phase donors for their support and invite all of our alumni and friends to consider making a special campaign gift to advance the University of Minnesota's Department of Pharmaceutics. Feel free to contact me at busch110@umn.edu or 866-437-0012 or the Pharmaceutics department head, Dr. Panyam, at jpanyam@umn.edu or 612-624-0951.

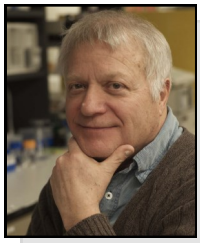
Sincerely,

Bob Busch

Director of Development

Faculty News & Activities

Professor William F. Elmquist



In October 2017, Dr. Elmquist and members of his lab participated in the BT5K Twin Cities Breakthrough for Brain Tumors Run and Walk, an inspiring and fun event benefiting the American Brain Tumor Association. As part of the University of Minnesota Brain Tumor Program team, they helped to raise over $2,000 which will be used to support brain tumor research and services for patients, families, and caregivers.

Dr. Elmquist was invited to give the following presentations this past year:

- *Blood-Brain Barrier Transport and Drug Delivery/ Efficacy in Primary and Metastatic Tumors in the Brain*. Brain Barriers Research Center (BBRC) Symposium, University of Minnesota, Minneapolis, Minnesota (October 2016).
- *Brain Tumor Interactions: A Complex, Dynamic System Influencing Efficacy and Resistance*. Brain Penetrant Inhibitors Symposium, Drug Discovery Chemistry, Cambridge Healthtech Institute, San Diego, California (April 2017).
- *Drug Delivery to the CNS: Barriers that May Influence Efficacy in Treating Tuberculosis in the Brain*. Tuberculosis-Meningitis Workshop, National Institute of Allergy and Infectious Diseases, Rockville, Maryland (May 2017).
- *Use of Novel Methods and Materials to Deliver Drugs to the Brain: The Problem of Brain Tumors*. International Conference on Advanced Engineering Functional Materials (ICAEFM 2017), Bhubaneswar, Odisha, India (September 2017).
- *Targeted CNS Delivery to Treat Brain Tumors: Many Challenges, Many Opportunities*. South Dakota State University, Brookings, South Dakota (October 2017).
- *Overcoming the BBB*. Society for Neuro-Oncology and Society for CNS Interstitial Delivery of Therapeutics (SNO-SCIDOT) Joint Conference, San Francisco, California (November 2017).
- *Transporters, Nanoparticles, and Brain Targeting: How Close Are We to a Clinical Solution?* Interactive Forum, Cerebral Vascular Biology, Melbourne, Victoria, Australia (November 2017).
- *A Systems Approach to the Complex and Dynamic Factors that Influence the Efficacy of Drugs in the Treatment of Brain Tumors*. Australasian Pharmaceutical Science Association and Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists (APSA-ASCEPT) Joint Scientific Meeting, Brisbane, Queensland, Australia (December 2017).

Professor Carolyn A. Fairbanks

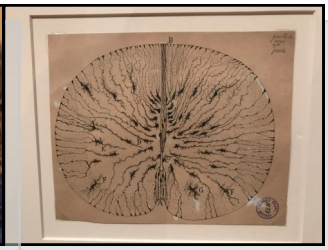
In 2016-2017, Dr. Fairbanks and her research team continued to contribute their expertise in intrathecal and epidural drug delivery for translational research collaborations with industry and other academic groups. Her research interests continue to focus on targeted delivery of gene therapeutics to specific central nervous system (CNS) neuronal subpopulations. This research is supported in part by the National Institute on Drug Abuse (NIDA) to investigate mechanisms of inhibition of opioid-induced tolerance. Her program also

Faculty News & Activities (cont.)

includes a strategy to develop gene therapeutics for the treatment of opioid addiction, an effort generously supported by another gift from the Noble family to the College of Pharmacy. Additionally, Dr. Fairbanks is in the final year of a three-year Neurosensory and Rehabilitation Research Award from the Department of Defense for her study *Controlling Neuropathic Pain by Novel Non-Opioid Pharmacological and Gene Therapeutic Approaches*. University of Minnesota collaborators include Dr. R. Scott McIvor (Genetics, Cell Biology, and Development), Dr. Lucy Vulchanova (Neuroscience), and Dr. Herb Nagasawa (Medicinal Chemistry). She also received a new award from MN-REACH to continue development of new medications to treat opioid addiction.

Dr. Fairbanks continues to be featured in the University of Minnesota's 2016-2017 "Driven to Discover" campaign for her contributions to addiction research and development of gene therapeutics and peripherally restricted analgesic medications. You can discover her story at z.umn.edu/fairbanksdriven and on Facebook at z.umn.edu/fairbanksdrivenFB or on Twitter at z.umn.edu/fairbanksdrivenTW.

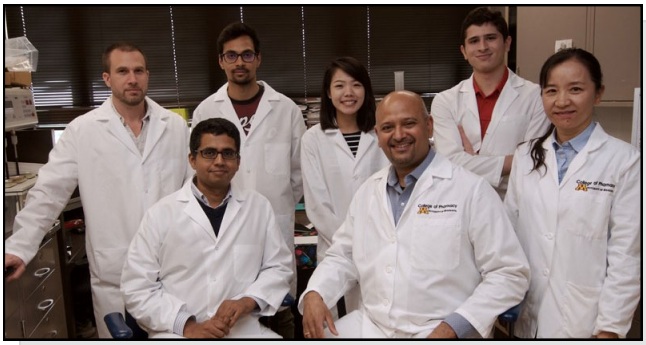
In early 2017, the University of Minnesota's Weisman Art Museum hosted *The Beautiful Brain: The Drawings of Santiago Ramón y Cajal*. Dr. Ramón y Cajal is considered to be the father of modern neuroscience and was also an exceptional artist. Combining scientific and artistic skills, he produced drawings with extraordinary scientific and aesthetic qualities. His theory that the brain is composed of individual cells rather than a tangled single web is the basis of neuroscience today. Dr. Fairbanks gave interested department members a personal tour of the collection and provided additional insights of the exhibit.



Professor Karunya Kandimalla

Dr. Kandimalla has been selected by the University of Iowa College of Pharmacy for the Genesis Award. The annual award honors graduates of the past 15 years who have achieved early distinction in their field.

Dr. Kandimalla's lab submitted several publications this year. Partnering with their Mayo Clinic collaborators, they are designing diagnostic probes for the early detection of peripheral insulin resistance in Alzheimer's disease patients. In addition, they have been developing translational approaches to repositioning and repurposing Alzheimer's disease drugs.



Dr. Kandimalla was invited to give the following presentations this past year:

- *Theranostic Nanovehicles for the Diagnosis and Treatment of Cerebrovascular Diseases*. American Institute of Chemical Engineers (AIChE) Annual Meeting, Minneapolis, Minnesota (October 2016).
- *Systems Pharmacology Approach to Repositioning Alzheimer's Drug Targets: Real Opportunity or Virtual Reality?* Bioinformatics and Computational Biology Program, University of Minnesota, Minneapolis, Minnesota (October 2016).
- *Novel Methods to Diagnose and Treat Alzheimer's Disease*. 68th Indian Pharmaceutical Congress, Visakhapatnam, Andhra Pradesh, India (December 2016).

Faculty News & Activities (cont.)

Professor Jayanth Panyam

Dr. Panyam was named Endowed Professor of Targeted Drug Delivery and nominated as a fellow of the American Associate of Pharmaceutical Scientists (AAPS).

Dr. Panyam was invited to give the following presentations this past year:

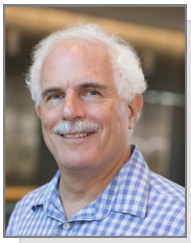
- *Whole Cell Based Phage Display Identifies Perlecan as a Target in Metastatic Breast Cancer and Melanoma*. Pharmaceutical Sciences Seminar, Oregon Health Sciences University, Portland, Oregon (November 2016).
- *Therapeutic Modification of Tumor Microenvironment to Boost Drug Delivery*. 2016 Center for Targeted Therapeutics and Translational Nanomedicine (CT3N) Symposium, University of Pennsylvania, Philadelphia, Pennsylvania (December 2016).
- *Improving Nano Drug Delivery*. Department of Pharmacology and Pharmacy, University of Hong Kong, Hong Kong, China (March 2017).
- *Therapeutic Modification of Tumor Microenvironment to Boost Nano Drug Delivery*. Department of Drug Discovery and Development, Harrison School of Pharmacy, Auburn University, Auburn, Alabama (April 2017).
- *Whole Cell Based Phage Display Identifies Perlecan as a Target in Metastatic Breast Cancer and Melanoma*. Zhongnan Hospital of Wuhan University, Wuhan, Hubei, China (June 2017).
- *Therapeutic Modification of Tumor Microenvironment to Boost Nano Drug Delivery*. Huazhong University of Science and Technology Tongji College of Pharmacy, Wuhan, Hubei, China (June 2017).
- *Nanoparticles for Targeted Drug Delivery*. Shenyang Pharmaceutical University, Shenyang, China (June 2017).
- *Nanoparticles for Drug Delivery*. Laboratoire Interfaces, Traitements, Organisation et Dynamique des Systèmes (ITODYS) Department of Chemistry, Université Paris Diderot, Paris, France (July 2017).
- *Therapeutic Modification of Tumor Microenvironment to Enhance Tumor Drug Delivery*. Pharmaceutical Sciences Seminar Series, University of Pittsburgh College of Pharmacy, Pittsburgh, Pennsylvania (September 2017).

Dr. Panyam contributed to the following presentations and poster sessions this past year:

- Kim H, Panyam J, et. al. *Nanoparticles as a Drug Delivery Platform for Enhanced Cancer Immunotherapy*. 3M's Annual Poster Session, Saint Paul, Minnesota (October 2016).
- Khanna V, Kalscheuer S, Kirtane A, Panyam J. *Antibody-Conjugated Nanoparticles for Targeting Metastatic Triple-Negative Breast Cancer*. American Association for Cancer Research Annual Meeting, Washington, DC (April 2017).
- Kim H, Panyam J. *Immunostimulatory Nanoparticles for Enhanced Cancer Immunotherapy*. Industrial Partners for Research in Interfacial and Materials Engineering (IPRIME) Annual Meeting, Minneapolis, Minnesota (May 2017).
- Moku GK, Meena J, Panyam J, Prabha S. *Cell-Penetrating Peptide TAT Increases Cellular Uptake of PLGA Nanoparticles in Mesenchymal Stem Cells*. Industrial Partners for Research in Interfacial and Materials Engineering (IPRIME) Annual Meeting, Minneapolis, Minnesota (May 2017).

Faculty News & Activities (cont.)

Professor Ronald A. Siegel



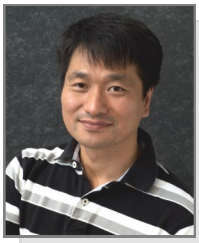
Dr. Siegel presented invited lectures at the Third International Conference on Biomaterials Science in Tokyo, Japan in November 2016 and the Conference on Transport in Nanostructured Materials - Design and Characterization in Varberg, Sweden in August 2017.

Dr. Siegel continues to direct the Biomaterials and Pharmaceutical Materials program for IPRIME (Industrial Partners for Research in Interfacial and Materials Engineering) at the University of Minnesota and is on the International Scientific Advisory Board for SuMo, a consortium of Swedish universities and companies, funded by the Swedish government, which focuses its research on biomaterials and other soft materials. He also serves on the advisory board for the Medical Devices Center at the University of Minnesota.

Dr. Siegel's work is supported by the following grants:

- *Intranasal Delivery of Benzodiazepine Prodrug/ Enzyme Combinations for Seizure Rescue* (NIH/MN-REACH).
- *Artificial Gut Simulator for Evaluation of Supersaturated Drug Formulations with Simultaneous Dissolution and Absorption* (Genentech, Inc.).
- *A Bioresorbable Osmotic Pump for Extended Post-Surgical Intraperitoneal Delivery of Therapeutic Agents* (University of Minnesota College of Pharmacy GAP Award).

Professor Changquan Calvin Sun



Dr. Sun has been promoted to full professor.

In August 2017, he chaired the micro-symposium on *Crystal Engineering Solutions to Improve Pharmaceutical Tableting* at the 2017 Congress of the International Union of Crystallography (IUCr) held in Hyderabad, India.

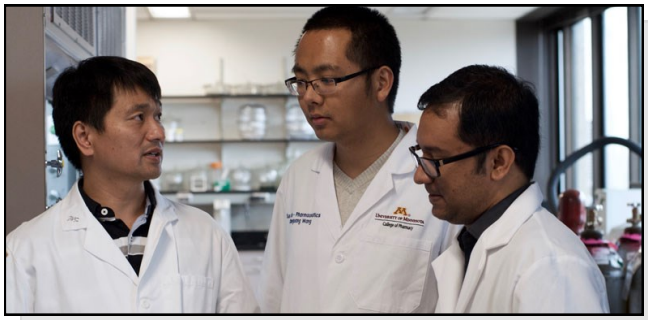
The Journal of Pharmaceutical Sciences (JPharmSci) selected Dr. Sun as a 2017 Top Reviewer and will be recognized at the 2017 American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition in San Diego, California this November 2017.

Dr. Sun was invited to give the following presentations this past year:

- *Formulation and Manufacturing Process Development by Dry Granulation or Direct Compression Considering Powder Characterization*. Astellas, Yaizu, Japan (April 2017).
- *Materials Science Tetrahedron: A Useful Tool for Pharmaceutical Research and Development*. Astellas, Tokyo, Japan (April 2017).
- *Cocrystals: Pharmaceutical Advantages and Preparation Strategies*. Daiichi-Sankyo, Tokyo, Japan (April 2017).
- *Recent Advances in Pharmaceutical Crystal Engineering*. Hoshi University, Tokyo, Japan (April 2017).
- *Successful Tablet Development Through Crystal and Particle Engineering*. Meiji Pharmaceutical University, Kiyose, Japan (April 2017).
- *Enable Successful Tablet Development Through Crystal and Particle Engineering*. SolidPharm, Hangzhou, China (April 2017).

Faculty News & Activities (cont.)

- *The Materials Science Tetrahedron for Successful Drug Product Development*. Zhejiang University of Technology, Hangzhou, China (April 2017).
- *The Materials Science Tetrahedron for Successful Drug Product Development*. Zhejiang University, Hangzhou, China (April 2017).
- *Applications of Pharmaceutical Powder Technology in Tablet Development*. Symposium on Industrial and Physical Pharmacy, Shenyang Pharmaceutical University, Shenyang, China (April 2017).
- *Recent Development in Expanding Solid-state Land Scape of Drugs*. China Pharmaceutical University, Nanjing, China (April 2017).
- *Importance of Excipient Physical Properties in Tablet Development*. Land O'Lakes Conference on Research and Development, Material Sciences Based Approaches to Improving Drug Delivery Performance: From Discovery Through Manufacturing, Madison, Wisconsin (June 2017).
- *The Materials Science Tetrahedron for Successful Drug Product Development*. Huazhong University of Science and Technology Tongji School of Pharmacy, Wuhan, Hubei, China (June 2017).
- *The Materials Science Tetrahedron for Successful Drug Product Development*. Zhongnan Hospital of Wuhan University, Wuhan, Hubei, China (June 2017).
- *The Materials Science Tetrahedron for Successful Drug Product Development*. South-Central University for Nationalities School of Pharmacy, Wuhan, Hubei, China (June 2017).
- *The Materials Science Tetrahedron for Successful Drug Product Development*. Huangshan College School of Pharmacy, Anhui, China (June 2017).
- *Improving Pharmaceutical Properties of Drugs Through Crystal Engineering*. National Engineering Research Center of Industry Crystallization Technology, Tianjin University, Tianjin, China (July 2017).
- *Strategies for Expanding Solid-State Landscape of Drugs*. National Engineering Research Center of Industry Crystallization Technology, Tianjin University, Tianjin, China (July 2017).
- *Structural Origin of Superior Plasticity and Tabletability of Theophylline Monohydrate*. 24th International Union of Crystallography (IUCr) Meeting, Hyderabad, India (August 2017).
- *Mechanical Properties of Amorphous Solid Dispersions*. American Association of Pharmaceutical Scientists (AAPS) Student Chapter, National Institute of Pharmaceutical Education and Research (NIPER), Chandigarh, India (August 2017).
- *Relationships Among Crystal Structures, Mechanical Properties, and Tableting Performance*. Structural Aspects in Studying Chemistry of Materials (SASCheM2017), Indian Institutes of Science Education and Research (IISER), Kolkata, India (August 2017).
- *The Roles of Compaction Simulation in Future Pharmaceutical Product Development and Manufacturing*. American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition, San Diego, California (November 2017).



Faculty News & Activities (cont.)

Professor Raj G. Suryanarayanan

Dr. Suryanarayanan hosted the spring meeting of the Dane O. Kildsig Center for Pharmaceutical Processing Research (CPPR) Industrial Advisory Board in May 2017 at the University of Minnesota. Forty-four individuals attended, including professors, students, post-doctoral associates, staff, and industrial partners with representatives from AbbVie, Allergan, AstraZeneca, Biogen, Boehringer-Ingelheim, Medimmune, Nanocopeia, Purdue University, SP Industries, Teva, University of Connecticut, and University of Minnesota. The mission of the CPPR is to foster an interdisciplinary approach to pharmaceutical processing-related research, catalyze interaction between industrial and academic scientists, and make the application of a basic science approach to formulation and manufacture of drug products an integral part of graduate pharmaceutical education.

Dr. Suryanarayanan also co-organized, served as a faculty lead, and lectured at a short course on *Solid Oral Dosage Forms*, delivered at Sun Pharma in Gurgaon, India in July 2017. Faculty from Duquesne University, Long Island University, University of Iowa, University of Maryland-Baltimore, University of Connecticut, and the Illinois Institute of Technology also participated in the short course which was organized through the National Institute for Pharmaceutical Technology and Education (NIPTE).

The Selection Committee for the International Pharmaceutical Excipients Council (IPEC) Foundation Awards added Dr. Suryanarayanan as a member.

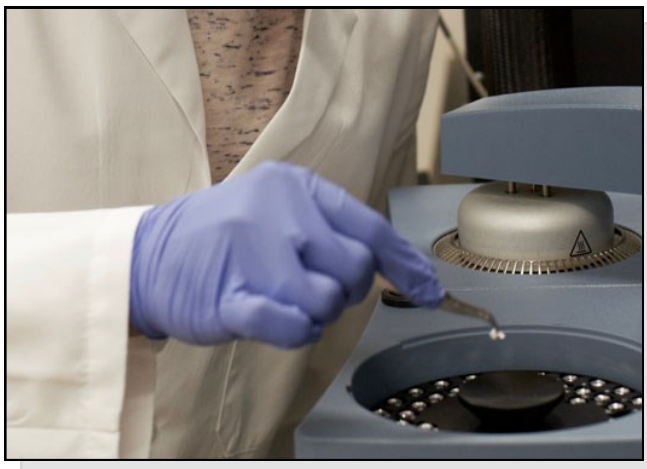
Dr. Suryanarayanan gave the keynote speech at the 2017 College of Pharmacy hooding ceremony at the TCF Bank Stadium Indoor Club Room in May 2017.

Dr. Suryanarayanan was invited to give the following presentations this past year:

- *Profiling Phase Transformations in Different Regions of Tablets by Two-Dimensional X-ray Diffractometry*. Biocon BMS, Bangalore, India (November 2015).
- *Amorphous Pharmaceuticals*. Aurobindo, Hyderabad, India (December 2016).
- *Effective Drug Delivery: Importance of Excipients and the Physical Form of the Active Pharmaceutical Ingredient (API)*. Sun Pharma, Gurgaon, India (December 2016).
- *Sun-NIPTE Collaboration: The Perspective of NIPTE Scientists and Academicians*. Sun Pharma, Gurgaon, India (December 2016).
- *The Influence of Excipients, Moisture, and Processing on Pharmaceutical Product Properties Relevant to Physical Stability*. Pfizer, Sandwich, United Kingdom (December 2016).
- *Preparing for Careers in Industry and Academia*. 68th Indian Pharmaceutical Congress (IPC), Visakhapatnam, India (December 2016).

Faculty News & Activities (cont.)

- *Role of Physical Form of the Active Pharmaceutical Ingredient (APID) and Excipients*. 68th Indian Pharmaceutical Congress (IPC), Vsakhapatnam, India (December 2016).
- *Interaction of Water with Amorphous Pharmaceuticals*. Advances in Dynamic Vapor Sorption Methods and Surface Energy Characterization Workshop, University of Minnesota, Minneapolis, Minnesota (April 2017).
- *Processing Induced Phase Transformations in Small Molecule and Protein Formulations: Implications on Drug Product Performance*. Biogen, Cambridge, Massachusetts (June 2017).
- *Solubility Enhancement Through Amorphization: Opportunities and Challenges*. Sun Pharma, Gurgaon, India (July 2017).
- *Predicting the Physical Stability of Amorphous Solid Dispersions*. Eighth International Discussion Meeting on Relaxations in Complex Systems, Wisla, Poland (July 2017).
- *Powder XRD Applications for Pharmaceutical Product Development*. Pharmaceutical Powder X-ray Diffraction Symposium (PPXRD-15), Hyderabad, India broadcasted via satellite to the 24th Congress and General Assembly of the International Union of Crystallography (IUCr 2017) (August 2017).



Dr. Suryanarayanan contributed to the following presentations this past year:

- Fung M, Suryanarayanan R. *The Use of Small Molecule Excipients for Improving the Physical Stability and Dissolution Performance of Ketoconazole Spray Dried Dispersions*. American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition, Denver, Colorado (November 2016).
- Koranne S, Govindarajan R, Suryanarayanan R. *Investigation of Spatial Heterogeneity in Salt Disproportionation in Tablets by Synchrotron X-ray Diffractometry*. American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition, Denver, Colorado (November 2016).
- Korrane S, Thakral S, Suryanarayanan R. *Effect of Formulation and Process Parameters on the Disproportionation of Indomethacin Sodium in Lyophilized Formulations*. International Society of Lyophilization - Freeze Drying, Chicago, Illinois (April 2017).
- Thakral S, Koranne S, Suryanarayanan R. *Spatial Heterogeneity in Mannitol Phase Composition in Co-Lyophilized Binary Systems*. International Society of Lyophilization - Freeze Drying Midwest Chapter Annual Meeting, Rosemont, Illinois (April 2017).
- Fung M, Suryanarayanan R. *Physical Stability Prediction of Amorphous Pharmaceuticals*. Industrial Partnership for Research in Interfacial and Materials Engineering (IPRIME) Annual Meeting, University of Minnesota, Minneapolis, Minnesota (May 2017).
- Koranne S, Govindarajan R, Suryanarayanan R. *Investigation of Spatial Heterogeneity in Salt Disproportionation in Tablets by Synchrotron X-ray Diffractometry*. Gordon Research Seminar on Preclinical Form and Formulation for Drug Discovery, Stoweflake Conference Center, Stowe, Vermont (June 2017).

Faculty News & Activities (cont.)

- Kulkarni SS, Rinella Jr. JV, Suryanarayanan R, Bogner RH. *Why Does Crystallization of Mannitol Lower the Reconstitution Times of Freeze-Dried Highly Concentrated Protein Formulations?* Gordon Research Seminar on Preclinical Form and Formulation for Drug Discovery, Stoweflake Conference Center, Stowe, Vermont (June 2017).
- Korrane S, Thakral S, Suryanarayanan R. *Formulation and Process Parameters on the Disproportionation of Indomethacin Sodium in Lyophilized Formulations*. Gordon Research Seminar on Preclinical Form and Formulation for Drug Discovery, Stoweflake Conference Center, Stowe, Vermont (June 2017).
- Thakral S, Thakral NK, Suryanarayanan R. *Estimation of Grain Size in Pharmaceutical Tablets by Two-Dimensional X-ray Diffractometry*. 66th Annual Denver X-ray Conference, Big Sky, Montana (August 2017).
- Kulkarni SS, Suryanarayanan R, Rinella Jr. JV, Bogner RH. *Why Does Crystallization of Mannitol Lower the Reconstitution Times of Freeze-Dried Highly Concentrated Protein Formulations?* International Society of Lyophilization - Freeze Drying (ISL-FD) Regional East Coast Chapter Meeting, Cambridge, Massachusetts (September 2017).
- Kulkarni SS, Suryanarayanan R, Rinella Jr. JV, Bogner RH. *Effect of Processing Conditions on Reconstitution Time of High Concentration Lyophilized Protein Formulations Containing a Crystallizable Excipient*. American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition, San Diego, California (November 2017).

Dr. Suryanarayanan received the following grants this past year:

- *Collaborative Research/GOALI: Processing and Stability of Amporphous Dispersions for Advanced Pharmaceutical Applications* (National Science Foundation).
- *Characterization of Frozen and Freeze-Dried Systems* (Bio-Techne).

The University of Minnesota has joined academic institutions, private companies, governmental entities, and non-profit organizations across the US as a partner in the newly established National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL), supported by the National Institute of Standards and Technology and several other participants. Dr. Suryanarayanan is one of seven researchers at the university who will provide leadership for the university's participation. They will leverage NIIMBL to transform biopharmaceutical manufacturing in the US by developing novel manufacturing platforms, increasing training and education in the biopharmaceutical sector, and expanding the workforce within the state. They will primarily focus on manufacturing and formulation aspects of gene and cell-based therapies.

Professor Timothy S. Wiedmann

Dr. Wiedmann returned to teaching the Drug Delivery I course in the PharmD curriculum and began teaching in the Pharmacokinetics course. This shift in faculty responsibilities was required with the retirement of Dr. Cheryl Zimmerman last year. Dr. Panyam has assumed leadership in the Biopharmaceutics course, which allows for a better match of faculty expertise to course content.

Faculty News & Activities (cont.)

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 Dr. Lisa Peterson's project, *Interactions Between Tobacco Smoke Constituents in Rodent Tumor Models*, and Dr. Stephen Hecht's project, *e-Cigarettes: Formaldehyde DNA Adducts, Oxidative Damage, and Potential Toxicity, and Carcinogenesis*. A new proposal initiated by Dr. Natalia Tretyakova in the Medicinal Chemistry department was also funded, which will involve rodent exposure to cigarette smoke and measurement of the formation of DNA adducts.

Dr. Wiedmann, along with Dr. Siegel, took the lead and worked with faculty to consolidate the content covered in the Pharmaceutics graduate program modules. The modules are four distinct courses: Physical Pharmacy I, Physical Pharmacy II, Pharmacokinetics, and Molecular Biopharmaceutics. The approach falls between the historical Preliminary Written Exam (PWE), where only textbooks were identified, and a traditionally structured course. Pharmaceutics graduate students must successfully complete all four modules before they can advance to the PWE, which is now a research proposal. The modules will serve as a means to determine knowledge proficiency and identify areas where students may need additional help.

Welcome Dr. Hongbo Pang

Dr. Hongbo Pang will be joining the University of Minnesota Department of Pharmaceutics as a tenure-track assistant professor in early January 2018.

Dr. Pang earned his BS in Biological Science from Peking University in Beijing, China and PhD in Biochemistry from the University of Utah in Salt Lake City, Utah. During his PhD program he was advised by Dr. Michael Kay and worked as a research assistant. Immediately after completing his graduate training, Dr. Pang joined the lab of Dr. Erkki Ruoslahti at Sanford Burnham Prebys Medical Discovery Institute in La Jolla, California and is presently working as a research assistant professor until his transition to the University of Minnesota.

Dr. Pang has rich experience in studying the recognition and entry of target tissue and cells by natural (e.g. virus) and artificial (e.g. peptide) agents. He studied HIV infection during graduate school and his work provided the first evidence that the physical property of viral particles, such as stiffness, regulates the viral ability of entry into target cells. During his post-graduate period, he extensively studied cancer biology and targeting peptides. A majority of his effort was devoted to characterizing the mechanism for the cell entry and tissue penetration by a class of tumor-homing peptides, dubbed CendR peptides. His work led to the discovery of a novel endocytosis process whose activity is modulated by nutrient-sensing networks and extracellular nutrient availability. He also utilized peptide engineering to improve the pharmacokinetic profile and drug delivery efficacy of CendR peptides. Dr. Pang has established expertise in phage screening and subsequent studies, such as receptor identification and translational applications. He has also identified peptides recognizing tumor-associated macrophage and developed peptide-targeting technologies for clinical diagnosis and therapeutic applications.

The central question that Dr. Pang's University of Minnesota lab will focus on is how to transport the cargo to the site of interest in the human body with high specificity and efficiency. His research synergizes multiple disciplines spanning from cell and cancer biology, peptide chemistry, nanomaterial to clinical imaging, and cancer therapies. His ultimate goals are to discover new delivery technologies, decode the underlying transport machineries, and develop novel diagnosis and treatment for cancer and other human diseases.

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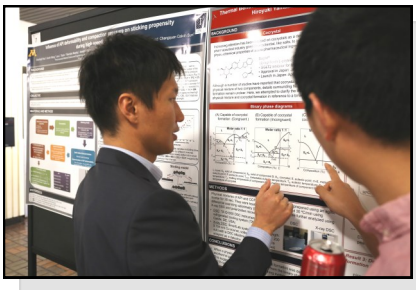
David J.W. Grant Symposium

The Fourth David J.W. Grant Symposium will be held at the University of Minnesota-Twin Cities in June 2018. An official announcement will be sent out when the date has been officially determined.

This symposium is held every other year in honor of the late Professor David J.W. Grant, a leader who helped to define the field of solid-state science. Leading researchers, from both academia and industry, will gather to share their most cutting-edge research. It will be a place for close interactions and exchange of stimulating ideas.



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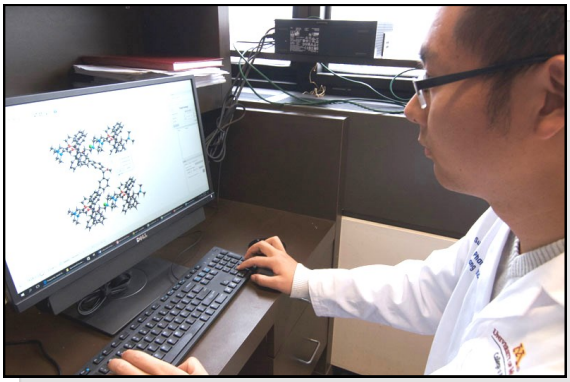

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