

Greetings from the Department Head



Dear Alumni and Friends;

Greetings from Purdue! It's summer here on the West Lafayette campus and warm weather has arrived. You might remember the telltale signs: the ice is finally gone from the sidewalks, the fountains are on, flowers decorate the campus, daylight lasts past 9:00 pm and roads are closed for summer construction projects. (Okay, I'm told the flowers are a relatively new thing, but perhaps you remember some of the others...) Behind the scenes, faculty and graduate students are making progress on research, taking advantage of the break in the academic calendar. We thought we'd take this opportunity to send you an update on activities in IPPH. This newsletter describes recent improvements in our research space, spotlights one of our research areas and highlights recent accomplishments of our faculty and students. We hope you'll take a moment to catch up with us by reading this newsletter. Better yet, if your summer travel plans include a visit to Purdue, please stop by. We'd love to see you. Hail Purdue!

Liz Topp

Dane O. Kildsig Professor and
Department Head

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Faculty and Student Highlights

FACULTY HIGHLIGHTS

- The Engineering Research Center (ERC) on Structured Organic Particulates received the 2010 Purdue College of Engineering Team Excellence Award. Drs. Lynne Taylor, Rodolfo Pinal and James Litster participate in the ERC (March).
- Dr. Stan Hem received the 2010 Dr. Aziz Outstanding Teacher of the Year award from the College of Pharmacy (April).
- Dr. Steve Byrn was quoted on the front page of the May 5th issue of *USA Today*, in an article on the Tylenol recall (May).
- Former IPPH faculty member, Dr. Philip R. Mayer, has been elected President-Elect of the American Association of Pharmaceutical Scientists (AAPS). His term begins in November. Dr. Meyer is now an Assistant Vice President at Wyeth Research.
- Dr. Patrick Belcastro, professor emeritus, celebrated his 90th birthday on June 3, 2010. In the year Dr. Belcastro was born (1920), the 18th amendment went into effect, outlawing the sale of alcoholic beverages in the U.S.; the 19th amendment was ratified, granting women the right to vote; the first radio broadcast occurred in Pittsburgh, PA; and Warren G. Harding was elected U.S. president.

GRADUATE STUDENT HIGHLIGHTS

- Basma Ibrahim (Yeo group) received a 2010-2011 pre-doctoral fellowship from the Clinical and Translational Sciences Institute (CTSI) of Indiana (May).
- Jared Baird (Taylor group) received a pre-doctoral fellowship from the American Foundation for Pharmaceutical Education (AFPE) and a Lilly Endowment Gift Graduate Research Award (April).

Faculty and Student Highlights (cont.)

- Andrew Otte (Carvajal group) received a Lilly Endowment Gift Graduate Research Award (April).
- Several of our students completed Ph.D. degrees recently. In alphabetical order, they are (with their post-graduation positions): Nathan Boersen (research scientist, Celgene Corp., Summit, NJ), David Ely (postdoc, Heinrich Heine University, Dusseldorf, Germany), David Lindley (research scientist, Abbott Laboratories, Abbott Park, IL), Jennifer Maguire (seeking employment, NJ), Michelle Papp (research scientist, Eurand Inc., Vandalia, OH), Kumar Vedantham (research fellow, Center for Biomedical Engineering Systems, UNC Charlotte).

BSPS STUDENT HIGHLIGHTS

- Krista Eakins, Danielle Carpenter and Brittany Phillips and their team earned a top prize in the 2010 Student Soybean and Corn Innovation Contest for their soy-based tablet binder (see photo at left, March).
- Margaret (Yitian) Chen, a senior BSPS student, competed with the Purdue Latin and Ballroom Dance Team in the collegiate championship of ABC's "Dancing with the Stars." The team placed second (May).



Graduate Student Spotlight: Li Pan

Li Pan is a fourth year graduate student in Dr. Greg Knipp's group. Li's doctoral research addresses the effects of fetal exposure to bisphenol A (BPA) on fatty acid homeostasis. She and Dr. Knipp hypothesize that BPA affects the expression of certain transporters, leading to changes in the distribution of fatty acids across the placenta. Her work involves studies in a rat placental cell line and the development of in vitro/in vivo correlations.

Li was one of the key organizers of the 2009 Pharmaceutics Graduate Students Research Meeting (PGSRM), held at Purdue last June. Organizing the conference gave her experience in fund raising, managing and delegating tasks, recruiting speakers, and in the logistics involved in putting together a multi-day event. She's grateful that the conference was a success and reports that she even had time to enjoy parts of it. She's also grateful to be spending this summer on her research.

Born in mainland China, Li Pan grew up in Panama City, Panama, and is fluent in three languages (Spanish, Cantonese, English). She is a 2006 graduate of Purdue's BSPS program. She credits a 2005 internship with Baxter in Bloomington with her decision to pursue graduate studies. Li loves cooking ("Asian-Panamanian fusion") and listening to Latin music. She hopes to complete her Ph.D. in 2011 and to secure a position in the pharmaceutical industry in the U.S., preferably in biopharmaceutics or biotechnology.

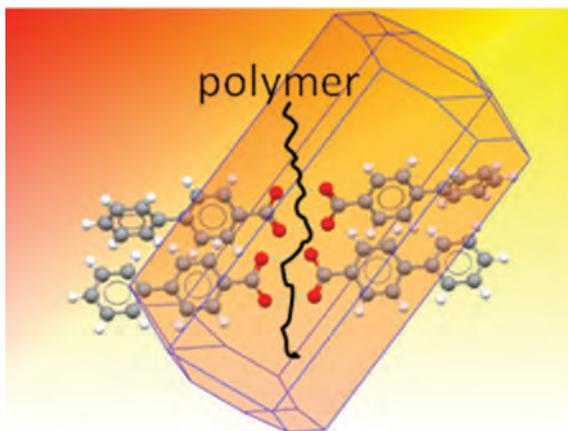
Endowed Professorship in Pharmaceutical Manufacturing

We're beginning a search for an endowed professorship in pharmaceutical manufacturing, a traditional strength of our department. We're looking for candidates with an internationally recognized research program and a record of high-impact contributions in pharmaceutical or biopharmaceutical manufacturing, pharmaceutical materials science, pharmaceutical engineering, and/or pharmaceutical biotechnology. The successful candidate will have a strong extramurally funded research program and the ability to contribute to both our professional and graduate education programs. This individual will also be expected to participate in the emerging Pharmaceutical Engineering program here at Purdue and to establish research collaborations with the pharmaceutical industry.

A link to the complete advertisement and position description is posted on our website (www.ipph.purdue.edu/). For additional information, please contact Dr. Rodolfo Pinal (rpinal@purdue.edu) or Ms. Mary Ellen Hurt (mhurt@purdue.edu). We value your suggestions of well-qualified candidates.

Research Spotlight: Preventing the Crystallization of Drugs – Why Do We Do it and How is it Accomplished?

The process of developing new drugs is becoming more challenging in more ways than one. One universal problem faced by drug developers is the fact that the aqueous solubility of promising new molecules has been spiraling downwards over the past two decades. However, in order for orally delivered drugs to be effective, they have to dissolve at some point in the gastrointestinal tract. Using the amorphous form of a drug can improve the dissolution rate of a poorly-water soluble drug and help improve its delivery. However, the downside to this approach is that given enough time, the amorphous drug in a tablet can crystallize and the bioavailability will be reduced. This is similar to what you might see for an old container of honey which has changed from a thick liquid into an opaque crunchy solid; this is an example of the type of slow crystallization that plagues amorphous drugs. The Taylor group studies how adding polymers to amorphous drugs can prevent this crystallization. At the moment they are studying how hydrogen bonding interactions between the drug and the polymer can help keep the drug from crystallizing from the solid drug-polymer matrix. Hydrogen bonding interactions are very important for drugs, both in terms of how they interact with biological receptors as well as how they direct the self assembly of drug molecules into ordered crystals. Hydrogen bonds help to connect the molecules in the crystal lattice, acting as “intermolecular



glue”. If these intermolecular interactions can be disrupted by forming hydrogen bonding interactions with bulky polymer molecules, an amorphous solid that does not crystallize very readily can be produced. The Taylor group is currently studying which polymers can form the best hydrogen bonding interactions with various drugs and how these interactions correlate with the crystallization

inhibition ability of the polymer. One tool used by the group is infrared spectroscopy, which enables drug-polymer hydrogen bonding interactions to be probed. Recent results (published in CrysEngCom, “Role of polymer chemistry in influencing crystal growth rates from amorphous felodipine” authored by IPPH graduate student Umesh Kestur and Lynne Taylor, <http://dx.doi.org/10.1039/c001905d>) show that the polymer which forms the strongest hydrogen bonds with the model drug, felodipine, is indeed the best inhibitor of crystal

growth. Ultimately, the Taylor group hopes to develop a set of drug-polymer interaction rules to identify the most effective crystallization inhibitors. Long term, this research should help to improve our ability to deliver some poorly-water soluble drugs using an amorphous formulation strategy. For more information about this work and other research in the Taylor group see <http://taylor.openwetware.org/>

New Research Space

We’re working to improve the research space for IPPH faculty, staff and students. Here are some recent upgrades:

Ross Enterprise Center – Due to space constraints, some IPPH research is conducted in rented laboratories off campus. In March, Drs. Steve Byrn and Kinam Park and their groups moved to new space in Suite Q of the Ross Enterprise Center. The Ross Enterprise Center is located in Purdue Research Park and owned by the Purdue Research Foundation (PRF). Suite Q includes 4500 sq. ft. of open-concept laboratory space and 2800 sq. ft. of office and conference room space. Seating for researchers is in cubicles outside the laboratory area. The groups moved to Suite Q from the Kent Building, which is also owned by PRF and has been slated for demolition. Ms. Mary Speer, who provides staff support for our graduate programs in regulatory and quality compliance, is now also located in Suite Q. Dr. Greg Knipp and his group moved from the Kent Building to labs in the Robert E. Heine Pharmacy (RHPH) Building as part of this relocation.

RHPH Renovations – The ground level of RHPH houses

the pharmaceutical manufacturing labs, as well as research laboratories for several IPPH faculty members and their groups. With support from Dean Svensson, the Lilly Endowment and the Purdue central administration, we are beginning a three-year process to renovate this area. Initial architectural plans include small molecule and biotech manufacturing areas, a mock-GMP gowning area and analytical support labs. The project has received initial approval from Purdue’s Capital Projects Committee.



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Upcoming Events:



Peck Symposium 2010

The Eighth Annual Garnet E. Peck Symposium will be held on Thursday, October 14, 2010, on the West Lafayette campus. The Symposium honors Dr. Garnet Peck, professor emeritus of Industrial and Physical Pharmacy and a pioneer in industrial pharmacy. This year's Symposium will address two themes: (i) the use of nanotechnology in drug delivery and (ii) drug formulation for pediatric use. Confirmed speakers for the nanotechnology theme are Dan Feldheim (Univ. Colorado), Justin Hanes (Johns Hopkins), Bumsoo Han (Purdue, Biomedical Engineering) and Yoon Yeo (IPPH). Confirmed speakers for the pediatric formulation theme are Gregory L. Kearns (Children's Mercy Hospital, Kansas City), Anne Zajicek (NIH), Jamie Renberger, M.D. (Indiana University School of Medicine) and Steve Byrn (IPPH). Visit the symposium's websites (www.ipph.purdue.edu/peck/ or www.conf.purdue.edu/peck/) for additional information and to register after August 1st.