

## ***Distinguished Seminar***

### ***Controlling “Controlled Release” to Make Medicine That Imitates Life***



#### **Dr. Steven Little** University of Pittsburgh

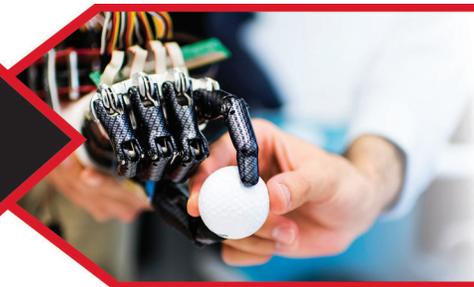
Although the field of controlled release (as applied to release of drugs, cosmetic agents, fertilizers, etc...) has existed for over 40 years, it is still non-trivial to formulate (or engineer) a system to produce a target release behavior (duration of release and rate of release). Over the last 13 years, our research group has

revealed fundamental phenomena in how the most widely-used degradable polymers degrade/erode and how this impacts release behavior from systems comprised of these polymers. These discoveries allow for more precise design of controlled release formulations that meet the specific needs of the customer. It also permits, for the first time, design of “biomimetic” controlled release systems that reproduce the basic spatio-temporal information transfer that naturally occurs between the cells in our body, with the goal of inducing and/or regulation key biological processes. Such is currently out of the reach of modern medicine. As just one example, simple temporal control over the release of specific growth factors can induce robust formation of specific tissues that naturally regenerate via stage-wise processes. This is possible using recent advances in the precise design of controlled release formulations. In the same way, this concept can also be used to reproduce spatial information that cells (and even tumors) employ to manipulate immunological responses. Collectively, these new tools can effectively reproduce biological context and have already shown significant promise as next-generation medical treatments in a variety of disease models where current medical treatments have no answer.

**Wednesday  
February 20, 2019  
240 Egan  
Research Center,  
Raytheon  
Amphitheater  
11:45 am**

Hosted by  
Chemical  
Engineering

**Events are open  
to the public**



## Biography



### **Dr. Steven Little** University of Pittsburgh

Dr. Steven Little is currently the William Kepler Whiteford Endowed Professor of Chemical and Petroleum Engineering, Bioengineering, Pharmaceutical Sciences, Immunology, Ophthalmology and The McGowan Institute for Regenerative Medicine at the University of Pittsburgh. He received his PhD in Chemical Engineering from MIT in 2005 under the mentorship of Robert Langer, with his thesis winning the American Association for Advancement of Science's Excellence in Research Award. Dr. Little's research focuses on controlled release and pharmaceutical formulation as well as biomaterial

and pharmaceutical excipient interactions, materials behavior ex vivo and in situ, and biomimetic design principles. Dr. Little was the first to develop a broadly-applicable mathematical design tool for degradable polymer-based controlled release formulations that produce customizable controlled release behavior. This work led to the founding of the first custom design controlled release formulation design company (for pharmaceutical industry, agricultural industry, and academic laboratories) in Pittsburgh, PA (Qrono Inc.). Dr. Little has also developed a number of novel controlled release and drug delivery formulations that mimic the body's natural processes including systems that can mimic the natural sequence of regenerative cues in wound healing as well as targeting the homing/recruitment of specific cell populations (immune cells, stem cells, etc.) to a local site for more highly sophisticated, next-generation regenerative medicine that requires only picograms-nanograms per kilogram of active ingredient per dose.

Dr. Little's research has resulted to date in over 90 peer reviewed publications and the founding of two spin-out companies located in Pittsburgh, PA. Dr. Little has delivered over 60 invited talks including 6 plenaries and 6 keynote lectures. Dr. Little has been recognized by national and international awards including the Curtis W. McGraw Research Award from the ASEE, being elected as a fellow of BMES and AIMBE, a Carnegie Science Award for Research, the Society for Biomaterials' Young Investigator Award, the Controlled Release Society's Young Investigator Award, the University of Pittsburgh's Chancellor's Distinguished Research Award, being named a Camille Dreyfus Teacher Scholar, being named an Arnold and Mabel Beckman Young Investigator, and being elected to the Board of Directors of the Society for Biomaterials and also the Controlled Release Society. In addition, Dr. Little's exceptional teaching and leadership in education have also been recognized by both the University of Pittsburgh's Chancellor's Distinguished Teaching Award and a 2nd Carnegie Science Award for Post-Secondary Education. Dr. Little was named one of Pittsburgh Magazine's 40 under 40, a "Fast Tracker" by the Pittsburgh Business Times, and also one of only five individuals in Pittsburgh who are "reshaping our world" by Pop City Media.

Dr. Little currently serves as the 12th Chairman of the Department of Chemical & Petroleum Engineering.

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