

# UNIVERSITY of HOUSTON

## CULLEN COLLEGE of ENGINEERING

Department of Civil & Environmental Engineering

### CIVE Seminar Series

#### Jason Patrick

Postdoctoral Research Fellow  
Beckman Institute for Advanced Science and  
Technology  
University of Illinois at Urbana-Champaign

#### Evolution of Multifunctional Fiber-Reinforced Polymer Composites

**Monday, December 5, 2016**

3:00 pm – 4:00 pm

Engineering Building 1, Room 102D

**Abstract:** A promising pathway for multifunctionality in fiber-composites is to mimic biological vasculature that enables living organisms with concerted homeostatic functions such as thermal regulation and self-repair. Here I will present a recently developed technique to create complex, three-dimensional (3D) microvasculature in structural fiber-composites. In addition to demonstrating active cooling and electromagnetic regulation via fluid circulation, an in-depth investigation into self-healing of interlaminar delamination will be discussed. The vascular architecture is critical for *in situ* mixing of reactive agents, polymerization, and repeated healing of delamination damage. Further microvascular fabrication advancements, e.g. 3D printing, are explored in addition to preliminary efforts towards integrating self-sensing components for complete material autonomy. This highly interdisciplinary research demonstrates the vast potential for improving operation and resilience throughout the service life of high-performance composite structures.

#### About the speaker:



**Jason Patrick** is a Postdoctoral Fellow at the Beckman Institute for Advanced Science and Technology at the University of Illinois Urbana-Champaign (UIUC). He obtained a Ph.D. in Structural Engineering at UIUC and both M.S./B.S. at North Carolina State University in Civil Engineering. His multidisciplinary research interests span the fields of solid/fluid mechanics, chemistry, materials science, and even microelectronics. He has contributed numerous publications to the scientific literature in addition to several patent applications towards commercialization of next generation technologies. His vision for the future of fiber-composites is focused on bioinspired enhancements to imbue these synthetic materials with evolutionary advantages in an engineered platform.