

University of Houston - Biomedical Engineering Seminar

Monday, February 14, 2022, 12 noon

Location: Health 1 Building (4349 Martin Luther King Blvd, 77204, RM 203)

or via Zoom:

<https://uh-edu-cougarnet.zoom.us/j/97219977403?pwd=VOIRTGhJMTdDQ1dwUDRJcGhYNTVFZz09>

High resolution imaging and modeling of collagen architecture alterations in ovarian cancer and idiopathic pulmonary fibrosis



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Abstract

Many human diseases including all cancers, fibroses, cardiovascular disease and connective tissue disorders are characterized by alterations in the collagen organization relative to normal tissues. We have developed Second Harmonic Generation (SHG) microscope tools to selectively and specifically probe all levels of collagen architecture. We successfully classified six types of ovarian tumors based on collagen fiber morphology. We also used this set of SHG analyses to probe structural changes in idiopathic pulmonary fibroses (IPF). We found analogous changes in all levels of collagen architecture in IPF. We developed an SHG image-based fabrication approach to create scaffolds to study the effects of collagen remodeling on cell-matrix interactions. We have also developed a machine learning approach using generative adversarial networks (GANs) to optimize scaffold design.

Biosketch

Paul J. Campagnola obtained his PhD in Chemistry from Yale and was a postdoc at Colorado. After a stint on Cell Biology faculty at Connecticut, he became an Associate Professor in Departments of Biomedical Engineering and Medical Physics at Wisconsin. He is currently the Tong Biomedical Engineering Department Chair and UW Kellett Faculty Fellow. He is a Fellow of the OSA, AIMBE, the Big 10 Alliance Academic Leadership Program. His research is focused on studying structural and functional aspects of the extracellular matrix, where he has developed optical microscopy instrumental and analysis methods to study problems in basic science as well as those with translational potential. He has over 100 peer-reviewed journal articles, several review articles and book chapters, co-edited a book "Second Harmonic Generation microscopy" and given over 100 invited talks. He serves on the editorial board for the Journal of Biomedical Optics and serves on numerous NIH and NSF review panels.