“Manipulating Light and Color with Soft and Structured Matter”

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Abstract:
Investigations of nature’s most fascinating light manipulation strategies can inspire design concepts for synthetic, hierarchically structured, functional optical materials and devices. While soft and fluid matter frequently enables tunable and stimuli-responsive optical characteristics in biological photonic systems, soft and fluid components still represent an underutilized class of materials in the optical engineers’ toolbox. My group tries to understand how organisms grow and form light-manipulating material architectures to translate useful biological design concepts into bioinspired dynamic optical materials. In this presentation, I will briefly discuss our efforts on visualizing butterfly scale structure formation and will then focus on the manufacture of bio-inspired dynamic photonic materials with nano-scale feature control and macroscale area throughput.

Bio: Mathias’ research focuses on the identification of unique biological light manipulation concepts and the development of bio-inspired, adaptive, and actively tunable micro-optical devices. He joined the faculty of MIT in November 2013. Prior to that, Mathias held a Feodor Lynen research fellowship of the Alexander von Humboldt - Foundation for postdoctoral studies at the School of Engineering and Applied Sciences of Harvard University, where his research was focused on bio-inspired photonics, bio-imaging and optical spectroscopy. He earned his degree in physics from the Saarland University in Germany and the University of Lorraine (formerly Henri Poincaré University) in France in 2006. Mathias then continued his graduate studies at the University of Cambridge in the UK at the Cavendish Laboratories, where he received his Ph.D. in 2010.