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Mid-IR supercontinuum generation using chalcogenide photonic crystal fibers

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Abstract

In this talk, I will focus on the research for mid-IR supercontinuum generation using chalcogenide photonic crystal fibers. I will describe a procedure for maximizing the bandwidth of supercontinuum generation in chalcogenide fibers and the physics behind this procedure. I show that it is possible to generate an optical bandwidth of more than 4 μm with an input pump wavelength of 2.5 μm using a chalcogenide fiber. Obtaining this bandwidth requires a careful choice of the fiber's waveguide parameters and input pulse power, which determines respectively the fiber's dispersion and nonlinearity. I will also show the simulation results for supercontinuum generation using tapered chalcogenide photonic crystal fibers. I demonstrate that an increased soliton self-frequency shift can be achieved using a tapered PCF. The overall bandwidth can be increased from 2.5 μm to 3.6 μm by using a tapered PCF. However, the ratio of the output power in the region between 3 and 5 μm to the input power decreases in a tapered fiber because of the increased fiber leakage loss.

Biography

Jonathan Hu received Ph.D. degree from University of Maryland, Baltimore County. Before he joined Baylor University as an Assistant Professor in Aug. 2011, he spent two years as a research associate at Princeton University. His research interests include nanophotonics, surface plasmon, light-emitting diode, electromagnetic wave, nonlinear optics, photonic crystal fiber, supercontinuum generation, and quantum optical communication.