

Abstract

Endoscopy has changed modern medicine by allowing physicians to explore inner organs with minimal trauma. Single optical fiber endoscopes offer the potential to further increase patient comfort and increase access to remote organs through miniaturization. Current research focuses on sub-millimeter endoscopy using dedicated optical fibers for imaging large volumes of tissue. One such fiber - the double clad fiber - allows many imaging modalities to be performed simultaneously for greater diagnostic sensitivity and specificity. Double-clad fiber couplers combine the properties of single-mode fiber light delivery with the high collection efficiency provided by multimode fibers. They are used in multiple sensing and imaging applications including surface plasmon resonance, optical coherence tomography, confocal and nonlinear microscopy.

Recent work from our laboratory allowed increasing their performance to quasi-lossless transmission through the single-mode core combined with >85% transfer efficiency of multimode light. This presentation will focus on novel double-clad fiber coupler designs as well as on the brief history of their commercialization.