Abstract

Gas detection in harsh environments has received increasing attention in recent years. The primary technique used for detecting a gas is using an appropriate wavelength source and observing the absorption peaks for a given gas. In this work the active sensor area consists of using a porous glass tube as a waveguide for a small section of the overall system. The hollow glass tube is being used to provide for large interaction volume with the gas. Currently light with wavelengths of 1520-1570nm are being used for gas detection. This porous glass tube is produced in lab from Corning Vycor glass. These tubes are produced using mini draw tower on campus and drawn to sizes 400-500 microns. The Vycor composition is a sodium borosilicate glass that undergoes spinodal decomposition which creates an interconnected 2 phase region throughout. The secondary phase is then removed using acid to create the porous glass. The porous glass tube is then bonded to commercial optical fibers to complete the set up. Thermal annealing has been used to change pore size to determine the optimal conditions for gas detection times, detection limits, and mechanical strength. SEM analysis to observe the pore sizes and structure was done as well as gas detection tests using Acetylene gas. “ImageJ” was used for a rough estimate of pore sizes and total porosity. Future work will focus on gas detection at elevated temperatures.

Biosketch

Mr. Adam Floyd is a Ph.D. candidate in the Department of Materials Science and Engineering at Virginia Tech and received his B.S. degree in Materials Science and Engineering in 2010 from University of Kentucky in Lexington, Kentucky. He is currently advised by Dr. Gary Pickrell with research interests in novel optical fibers with emphasis on semiconductor core fibers.