PREPARATION AND APPLICATION OF THE ORGANIC SILICA/ACRYLIC ACID/OPTIC FIBER BIOSENSOR

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In this study, using the special fiber technology, which were spliced by the hollow fiber and the single mode fiber to produce double cone structure to form a highly sensitive fiber Mach-Zehnder interferometer (MZI). Then combining the acrylic acid (AA)/organic siloxane coupling agent by sol-gel and photo-polymerization methods were used as a sensing layer. The organic silica/AA/optic fiber biosensor (OFB) contains acidic functional groups, which didn't need to be labeled and can instantly detect the concentrations of ammonia water. The sensing principle is that the carboxylic acid groups (-COOH) of poly-AA can undergo acid-base neutralization reaction with ammonia water, and resulting in a change in the transmission response of the fiber causes the wavelength shift in the spectrum. The concentration changed and response time of ammonia water were obtained from the degree of light spectrum drift. The ratio of AA in the sensing layer directly affects the amount of light drift and response time of ammonia sensing. The results showed that this organic silica/AA/OFB has an excellent resolution in very small amount (ppm) of ammonia water and at less than 30 seconds. Moreover, this OFB presented many advantages of simple manufacturing, anti-electromagnetic interference, small size, portability and high sensitivity and so on. It will be a valuable physiological parameter monitoring device for environmental detection and medical care in future.

Keyword - Optic fiber; biosensor; Mach-Zehnder interferometer; ammonia water; sol-gel