Abstract

Optical fiber sensors have been widely used in various applications, such as medicine, industrial production, transportation, and civil engineering. In this work, optical fiber sensor with different deposition periods times (1h,12h, and 24hour) was fabricated to measure the refractive index based on the phenomena of localized surface plasmon resonance.

A novel technique well-known as photodeposition has been used to adhered silver nanoparticles on the end of optical fiber, uses laser diode coupled with optical fiber and silver nanoparticles suspended in an ethanol. The optical sensor was assembled using a tungsten lamp as white light source, a spectrum analyzer and an optical fiber with silver nanoparticles.

The sensing region from optical fiber end immersed at a different media such as (air, distilled water, benzene, hexane, aniline) which leads to recorded a different refractive indices in the range of (1-1.568), the concentration of silver nanoparticles deposited at the fiber end was measured according to the deposition period that the tip has immersed in. The concentration of silver nanoparticles that immobilize on the optical fiber end which were measured by Energy Dispersive X-ray technique were 5.21%, 35.7% , and 80% at 1 hour, 12hours, 24 hours, respectively. Further, the sensitivities of 150.41 nm/RIU, 130.54 nm/RIU, and 91.579 nm/RIU have been measured at 1 hour, 12 hours , and 24 hours, respectively. The LSPR peak wavelength is linearly shifted to longer wavelengths as the refractive index is increased