Abstract

In the present investigation modified optical fiber sensors (OFS) are manufactured to measure temperature by using nano-coating technique. Four types of nanoparticles are used as a coat for the fiber optics cladding TiO2, Cu, Ag, and Al2O3 nanoparticles. The modified structure fiber optics is prepared by immersing the parent region of fiber optics in Hydrofluoric acid (HF 40%) for 30 min. Then, the treated section is coated with nanoparticles using impregnation technique for one min of impregnation time and the process is repeated four times to be sure from formation of a constant nano-coat. Many measuring techniques are used to characterize the specifications of nanomaterials and fiber optics such as: scanning electron microscope SEM, x-ray diffraction XRD, absorption spectrum UV and spectra intensity are show by optical spectrum analyzer (OSA).

The results show the temperature sensing process improved successfully by using nano-coating technique for parent fiber optics. The enhancement in temperature sensitivity is coming from the high interaction between the light propagation and the nanoparticles cladding which is obtain via an evanescent filed. Therefore, it is concluded that the TiO2 and Al2O3 nanoparticles show the highest temperature sensitivities with values of 245 counts/ ^{0}C and 153.2 counts/ ^{0}C respectively.

On the other hand the Ag and Cu nanoparticles temperature sensitivities showed values of 112.8 counts/ ^{0}C and 124.8 counts/ ^{0}C respectively. The enhancement can be explained on the basis that the presence of nanoparticles in the cladding zone give high absorption specification for the light. Also, the nanoparticles cladding have high surface area in compression with parent fiber optics. The results show that temperature sensitivity is depended on the

II

wavelength phase-shift. The values of the wavelength phase-shift for TiO2 and Al2O3 coated fiber optics are 1.806 nm/ ^{0}C, and 2.435 nm/ ^{0}C; respectively.