

ABSTRACT

The purpose of this study is to design sensor for zinc in different concentration, of blood and serum for male and female. Zinc concentration change effect on immune system which its necessary to be in normal region to protect human body from COVID19.

PCF was used as sensor surround by blood with different concentration of male and female, because the percentage of zinc in a woman's blood decreases due to pregnancy and breastfeeding.

Laser with wavelength 450nm used as its emission band lie in absorption band of zinc, light propagate through PCF and sensing into the blood surround it by the phenomena of Mach Zehnder ,the small zinc concentration and high zinc concentration can be measure by using PCF but any small change in zinc concentration can't be measure.

The sensitivity of PCF after tapering can be measure by taken the sloop curve between wavelength and zinc concentration change, the sensitivity in simulation setup of female blood $3.23 * 10^{-3} \text{nm} * 100 \text{ mL}/\mu\text{g}$ and $3.151 * 10^{-3} \text{nm} * 100 \text{ mL}/\mu\text{g}$ for male blood, the experimental set up for female blood $3.1 * 10^{-3} \text{nm} * 100 \text{ mL}/\mu\text{g}$ and $3.048 * 10^{-3} \text{nm} * 100 \text{ mL}/\mu\text{g}$ for male blood.

The percentage of error between simulation and experiment set results of female blood sensitivity is 4% while the percentage of error for male blood sensitivity is 3.3%.

The sensitivity of zinc concentration in serum for both male and female can be taken from the sloop curve between the wavelength and zinc concentration, the simulation result for zinc concentration in female serum is $9.28 * 10^{-3} \text{nm} * 100 \text{ mL}/\mu\text{g}$ and $9.236 * 10^{-3} \text{nm} * 100 \text{ mL}/\mu\text{g}$ for male serum, the experimental sensitivity results for female serum $8.99 * 10^{-3} \text{nm} * 100 \text{ mL}/\mu\text{g}$ and $9.05 * 10^{-3} \text{nm} * 100 \text{ mL}/\mu\text{g}$ for male serum,

The percentage of error between simulation and experiment set results of female serum sensitivity is 7.12% while the percentage of error for male serum sensitivity is 6.08%.

The small change in zinc concentration can be measured after tapering PCF by flame in experimental set up and by design new model its dimension taken from experimental set up in simulation set up, the model was design by comsol multiphysicas 5.4 as a simulation program to simulate the experimental set up, red shift results in OSA as zinc concentration increase in blood samples. The same set up experimental and simulation was used for zinc in serum of male and female, all the work was done through Corona pandemic

40nm wavelength used too in PCF as detector for X-ray, as it is used in detect COVID in human chest and abdominal, as the explosion for X-ray may cause risk in human body so PCF

used as detector for x ray of abdominal and chest, Comsol multiphysics 5.4 used only in this work to avoid catching COVID-19, before tapering can sense only high doses change while small change in approximate effective dose used can be detected by using PCF after tapering ,while in X-ray of chest only PCF before tapering used as there is big change in X-ray dose