

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Summarily, the study proved the synthesis of AuNPs along with its derivative showed to be successful as the results from UV-Vis, FTIR and DLS spectroscopy well explained the characteristics of the resulting colloid from the experiment. Apart from fabricating AuNPs for sensor study, μ PAD fabricated in this study also able to provide rapid testing by having highest flowrate while using lowest volume of fluid used. Design-wise, μ PAD with 3.0 mm proved to have highest flowrate. However, due to no visible colour change upon addition of HCG into functionalized AuNPs suspension, the μ PAD was not able to be applied as the sensor platform. Usage of AuNP-GSSG as HCG sensor was shown to have a good linear response with R^2 value of 0.9877, along with LOD value of 0.1577 ppm indicating highly sensitive towards presence of HCG in standard solution. Despite the good linearity and sensitivity, AuNP-GSSG has shown to not be selective towards HCG as the interference study proved presence of impurities highly interfered with the detection of HCG.

6.2 Recommendations for future studies

As the project was completed, several amendments can be done to improve this project quality and data collection.

1. Using different sensing component, such as primary antibodies. Albeit commonly used and incurs high cost, antibodies were specific sensing components for biochemical compound and proven highly reliable for detection of HCG.
2. Using different transducing component, namely copper nanoparticles or silver nanoparticles. Both nanoparticles were considerably cheaper and inflict lower production cost, yet SPR of both nanoparticles were less significant than shown by AuNPs.
3. Using different detection method, such as fluorometry. AuNPs exhibited fluorescence excitation at 695 nm (Figure 6.1). This phenomenon can be utilised further as AuNPs also possessed quenching ability via Förster resonance energy transfer (FRET) with another chromophore, namely quantum or carbon dots.

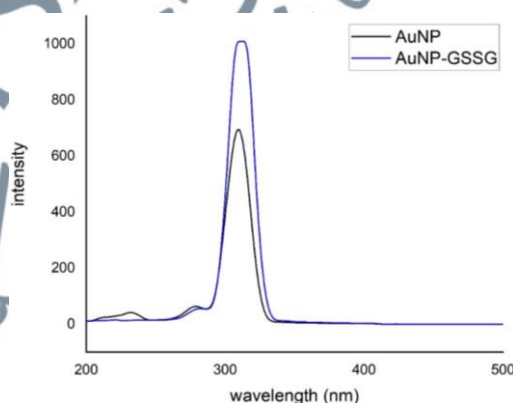


Figure 6.1: Excitation fluorescence spectra of AuNPs and its GSSG derivative

4. Investigate the effect of particle size of AuNPs for HCG sensing. To date, only effects of particle size of gold nanoflowers have been studied, yet effects of spherical AuNPs particle size for HCG sensing have not been reported in any publications. It is in the best interest to study on the effect of particle size of AuNPs for HCG sensing in future.