

CHAPTER 5 CONCLUSION AND FURTHER RESEARCH

5.1 Conclusion

The synthesis of $\text{Fe}_3\text{O}_4/\text{CQD}@\text{ZIF-8}$ nanocomposites was successfully carried out and confirmed through XRD, FTIR, and AFM characterization results. Variations in the ratio of Zn^{2+} and 2-Hmim precursors affected the fluorescence intensity and dispersion stability. The fluorescence intensity increased as the ratio of Zn^{2+} to 2-Hmim precursors increased. On the other hand, dispersion stability decreased as the ratio of Zn^{2+} to 2-Hmim precursors increased. Nevertheless, at a precursor ratio of 0.1 g Zn^{2+} :0.22 g 2-Hmim, a zeta potential of -39.2 mV was obtained, which remains within the stable range. The results of this study indicate that the ratio of Zn^{2+} to 2-Hmim precursors has a different effect on fluorescence intensity and dispersion stability it increases fluorescence intensity but decreases dispersion stability.

5.2 Further Research

Based on the results of the study on $\text{Fe}_3\text{O}_4/\text{CQD}$ nanocomposite encapsulation using ZIF-8, there are several recommendations for future research to ensure that the results obtained are more optimal and practical:

1. Further research can be conducted by investigating different amounts of ZIF-8 precursors between the variations used in this study. This aims to determine the optimal amount of ZIF-8 precursors that can increase the fluorescence intensity while maintaining good colloidal stability with an absolute zeta potential value of ≥ 30 mV.
2. Further research is recommended to measure the magnetic properties of the $\text{Fe}_3\text{O}_4/\text{CQD}@\text{ZIF-8}$ nanocomposite using a vibrating sample magnetometer (VSM) to determine the effect of ZIF-8 encapsulation on the magnetic characteristics of the nanocomposite.
3. Further research is recommended to conduct biocompatibility and stability tests in biological media to evaluate the biocompatibility, toxicity, and dispersion stability of the $\text{Fe}_3\text{O}_4/\text{CQD}@\text{ZIF-8}$ nanocomposite, so that its

potential applications in the biomedical field particularly as a bioimaging material and drug delivery system can be further investigated.

