CHAPTER 6

CONCLUSION AND FUTURE RECOMMENDATIONS

This chapter summarizes the research as a whole. The conclusion part is also provided for Chapter 2 until Chapter 5 to summarize the research of the respective chapters and indirectly to emphasize the key points of the chapters.

This research shows that the milk quality can be investigated through light propagation theory. The experimental and theoretical analysis have been done to achieve the objectives of the research. Various types of spectrometers such as VIS-NIR, NIR and FTIR spectrometers were used to conduct the spectrometry experiments on various types and conditions of milk. Based on the results, it is proved that the optical properties of milk can be analysed through light absorption and scattering. Besides that, the newly opened milk and fermented milk are also analysed. The results show that the newly opened milk has higher light absorbance and less light transmission compared to the fermented milk, as the aggregated particles in fermented milk affect the milk quality.

The experiments performed on different types of milk show that the concentration of samples and the amount of proteins, fat, and carbohydrates can affect the absorbance and fluorescence of light across the medium. Moreover, the modeling of random lasers for various types of milk shows that the fat content and dye concentration can influence the properties of random laser. Higher amount of fat content and dye concentration can produce higher light amplification.

Thus, this research aims to contribute on studying the milk quality and milk contents through the light propagation theory from experimental and theoretical aspects.

The study of light propagation in milk can assist the dairy industry to improve the quality of milk. The research also can help dairy consumers to have more understanding on milk contents. They can consume the right types of milk to have a healthy diet.

Furthermore, the modeling of random lasers for different types of milk based on light propagation theory can be used to monitor laser emission from milk. The lasers would be able to differentiate the amount of fat, protein, and carbohydrate in milk. The modeling results may assist future researchers to set up random laser experiment based on parameters given. With the increase of market demand on sensing, this study can contribute to the invention of biosensors to monitor the milk quality.

For future recommendation, different concentration of milk can be included in the spectrometry experiments. Besides that, higher sensitivity and accuracy of spectrometers can be used to have more consistent and accurate reading. The spectrometry experiments can also be used to investigate the optical properties of different types of water to solve water pollution issues. The optical properties of milk can be converted into electrical signal using charge couple camera sensors and oscilloscope to develop sensors to monitor the quality of milk. The modeling also can be upgraded by interfacing with graphical user interface to be more user friendly.