CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

There are two parts in this work. First part is synthesis of CeO_2 using polyelectrolytes and another part is synthesis of CeO_2 at the surface of Ag nanoparticles. The polyelectrolytes were used in this work are PSS, PAA, COPSS and PDADMAC. By observing the photo-catalytic activity, the most to least efficient polyelectrolyte for the synthesis of cerium is PAA, COPSS, PSS and PDADMAC, consecutively. This is due to the different size of CeO_2 obtained from using different polymers for the synthesis. Moreover, the size of CeO_2 which synthesized by using polymers is depend on charges densities. The suitable concentration of PAA to synthesis of CeO_2 is 20 mM due to the smallest size of CeO_2.

Secondly, CeO_2 with Ag nanoparticles were successfully synthesized. Ag nanoparticles can improve the photo-catalytic activity of CeO_2 because Ag nanoparticles can prevent the recombination reaction of electron from conduction band to valence band and also enhanced the photon harvestment. Moreover, the size of Ag nanoparticles was controlled by the concentration of $AgNO_3$ and COPSS which affected the photo-catalytic activity. The photo-catalytic activity increases with decreasing CeO2 size with Ag nanoparticles. The size of Ag nanoparticles decreases with decreasing $AgNO_3$. The best concentration of COPSS for Ag nanoparticles synthesized is 0.01 mM because it produces the smallest Ag nanoparticles size.

In the future work, we should study on the dispersion of CeO_2 nanoparticles and try to do the photo-catalysis under visible light. Furthermore, the photo-catalytic activity can be improved by introducing the porous substrate using layer-by-layer technique. In this work, we just found the suitable conditions to obtain CeO_2 for photo-catalysis and suitable condition for synthesis of CeO_2 with Ag nanoparticles for photo-catalytic application.