CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In this research, the synthesized mesoporous-assembled TiO_2 nanoparticle photocatalyst was synthesized by a sol-gel process with the aid of structure-directing surfactant, immobilized on the glass plate by the doctor blading method, and used to investigate the photocatalytic degradation of Acid Black (AB) diazo dye. The effects of various preparation parameters during the immobilization step, including calcination temperature, added P-25 TiO_2 content, and number of coated layers, on the photocatalytic AB dye degradation performance of the synthesized mesoporous-assembled TiO_2 photocatalyst were examined. The photocatalytic activity of the synthesized mesoporous-assembled TiO_2 photocatalyst film was found to slightly increase with increasing calcination temperature; however, the presence of P-25 TiO_2 added to the synthesized mesoporous-assembled TiO_2 photocatalyst film could more significantly enhance the photocatalytic activity. The synthesized mesoporous-assembled TiO_2 photocatalyst film with 5 wt.% P-25 TiO_2 addition and calcined at 400 °C provided the highest photocatalytic AB dye degradation activity. Moreover, the increase in number of coated TiO_2 layers caused the increases in the AB dye degradation efficiency and reaction rate constant until reaching the peel-off limitation at 4 layers.

5.2 Recommendations

- An effective way to increase the film thickness of the P-25 TiO_2-added synthesized mesoporous-assembled TiO_2 photocatalyst film without any film peel-off should be examined.
- To further apply the P-25 TiO_2-added synthesized mesoporous-assembled TiO_2 photocatalyst film, the photocatalytic degradation of other dyes with more complex molecular structures and the recyclability of the film should be investigated.
- The metal cocatalyst (e.g. Cu) loading during the gel preparation step should also be studied for the system with high level of dye contamination since the loaded metal is expected to enhance the photocatalytic degradation efficiency.