CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In this research, the mesoporous-assembled $SrTi_xZr_{1-x}O_3$ nanocrystal photocatalysts with various Ti-to-Zr molar ratios (as expressed by x in the $SrTi_xZr_{1-x}O_3$ where x = 0-1) were synthesized by a sol-gel process with the aid of a structure-directing surfactant and used to investigate the photocatalytic degradation performance of Acid Black (AB) diazo dye. The synthesized mesoporous-assembled $SrTi_{0.9}Zr_{0.1}O_3$ photocatalyst was found to show a better photocatalytic AB degradation performance than the other $SrTi_xZr_{1-x}O_3$ photocatalysts. The effects of various synthetic parameters, including calcination conditions and Pt loading, on the photocatalytic AB degradation performance of the synthesized $SrTi_{0.9}Zr_{0.1}O_3$ photocatalyst were examined. The photocatalytic activity of the mesoporous-assembled $SrTi_{0.9}Zr_{0.1}O_3$ photocatalyst without and with Pt loading was also found to strongly depend on the calcination temperature. Moreover, the presence of Pt on the $SrTi_{0.9}Zr_{0.1}O_3$ photocatalyst can enhance the photocatalytic activity. The optimum conditions for synthesizing the effective $SrTi_{0.9}Zr_{0.1}O_3$ photocatalyst were a Pt loading of 1.0 wt.%, a calcination temperature of 850°C, and a calcination time for 4 h, providing the highest photocatalytic AB degradation activity.

5.2 Recommendations

To further apply the synthesized mesoporous-assembled $SrTi_{0.9}Zr_{0.1}O_3$ photocatalyst, the photocatalytic degradation of other dyes with more complex molecular structure or mixed dyes (competitive decomposition) should be investigated.

To prevent electron-hole recombination and enhance the photocatalytic degradation performance, deposition of noble metals has been employed to expedite electron transfer to outer surface for the degradation reaction. In addition to the most investigated Pt, the other monometallic and bimetallic metals, such as Ag, Cr, La, Ni, Cu, Pt-Ag, Pt-Cr, Pt-La, Pt-Ni, and Pt-Cu, are also interesting for a further study.