

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The order MSP ceria-zirconia was successfully synthesized using MSP MCM-48 as a hard template via the nanocasting process. The optimal conditions studied were to use 4 h stirring time at 100 °C evaporated temperature. The XRD and TEM results confirmed the existence of the order MSP structure from the MCM-48 template whereas the XRF results confirmed the removal of the silica template from the order MSP ceria-zirconia. Comparing the molar ratio of ceria-zirconia; the MSP $\text{Ce}_{0.75}\text{Zr}_{0.25}\text{O}_2$ exhibited higher surface area and more homogenous distribution than the MSP $\text{Ce}_{0.60}\text{Zr}_{0.40}\text{O}_2$. The resulting product provided similar pattern to cubic fluorite structure of ceria. The TPR profiles had a wide range reduction temperature and resulted in a decrease in the bulk phase lattice oxygen when adding the zirconia content. The TPR results of the MSP $\text{Ce}_{0.75}\text{Zr}_{0.25}\text{O}_2$ provided only surface reduction temperatures at 280–620 °C.

5.2 Recommendations

The synthesized order MSP $\text{Ce}_{0.75}\text{Zr}_{0.25}\text{O}_2$ should be continuously studied by loading an active metal for using as a Three-Way Catalyst (TWC).