CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The study of $Au/CeO_2–Fe_2O_3$ catalysts was investigated to produce hydrogen from OSRM, the supports were prepared by co-precipitation and precipitation technique, the Au loading was prepared by a deposition precipitation technique. The influences of main parameters were considered support composition (Ce/(Ce+Fe) atomic ratio), calcinations temperature (200 °C–400 °C), and Au loading (1 wt%–5 wt%) on the catalytic performance, it was found that the 3% Au/CF(0.25) calcined at 300 °C exhibited the highest catalytic activity in the whole temperature studied. TPR technique was found that the reduction of Au_xO_y species, and the reduction of Fe_2O_3 to Fe_3O_4 of 3%Au/CF(0.25) was shifted to lower temperature, resulting in the strong metal-metal and metal-support interactions in the prepared catalysts. The mixture of CeO_2 and Fe_2O_3 can enhance higher activity when compare with pure CeO_2 and pure Fe_2O_3 as support. In addition, the H_2O/CH_3OH and O_2/CH_3OH molar ratio were studied, found that at the 2/1 and 0.6/1 molar ratio, respectively, gave the highest methanol conversion and hydrogen concentration in the low temperature operating (200°C–300°C), suggesting in the combination of SRM and POM in the feed which is the OSRM was responsible for hydrogen production. Moreover, O_2 pretreatment was not significant effect to catalytic activity supported by XRD technique, there are no phase changing when catalyst are treated with O_2. The stability test of unpretreated, and pretreated catalysts was slightly decreased for 720 minute testing, according to, TPO technique had the little amount of coke formation in the spend catalysts of unpretreted, and pretreatment catalyst.

5.2 Recommendations

The catalyst of the same composition should be prepared in the same bath because the consistent of prepared catalyst seemed to be a significant factor effect to the catalytic activity.

The further characterize to explain the chemical state of gold is X-ray photoelectron spectroscopy (XPS) in order to investigate state of gold on the surface of catalyst that relate to catalytic activity.

To achieve higher the hydrogen production and lower CO concentration in the low temperature operating of the OSRM, the bi-metallic containing Au and Ru over CeO_2–Fe_2O_3 support is recommended, which may be high activity for this reaction.