CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

Synthesis of high surface area tin oxide via sol gel process was successful in this thesis work, using tin glycolate precursor synthesized from tin oxide, ethylene glycol and triethylenetetramine used as base catalyst via the Oxide One Pot Synthesis (OOPS) process. TGA result gave 63.25% ceramic yield which was closed to 63.11% theoretical ceramic yield. Moreover, C^{13}-NMR confirmed the expected tin glycolate structure having 2 ethylene glycolate ligands connecting with one Sn atom.

Tin glycolate was moisture stable, being able to slow down hydrolysis rate in the sol-gel process, giving higher branched network. From our studied, tin glycolate was dissolved in 8 M HNO_3 to form gel at room temperature, and importantly, to form high surface area tin oxide. The results showed that calcinations temperature and HNO_3/H_2O ratio were important to the tin oxide product. Increase in calcinations temperature gave higher crystallinity, lowered surface area. Significantly, acid concentration increased the hydrolysis and condensation rates, shortening the gelation time, as a result, giving a lower branched tin oxide network, as can be confirmed by the decrease of surface area. Calcinations temperature, time and calcinations heating rate of 300°C, 4h and 0.5°C/min, respectively, and 0.4 of 8 M HNO_3/H_2O ratio provided the highest surface area of ~ 510 m^2/g.