

## CHAPTER IV

### CONCLUSIONS

The  $\text{MgAl}_2\text{O}_4$  spinel powder produced from very inexpensive and relatively abundant starting materials was successfully obtained via the one oxide pot synthesis (OOPS) process, directly by solid-state reactions, and by the reaction between alumatrane and magnesium methoxide,  $[\text{Mg}(\text{OMe})_2]$ .

The ceramic yields obtained from the OOPS derived precursor were the same as those obtained from the reaction of alumatrane and  $\text{Mg}(\text{OMe})_2$ . However, both methods took much shorter time, 2 h, to convert to spinel than required for the solid-state reaction, which took more than 15 h at the same temperature of  $1100^\circ\text{C}$ . Additionally, the solid-state reaction gave impure products due to nonuniform reactant ratio and/or incomplete reaction.

The spinel prepared from OOPS process can be used as a humidity-sensing element, as compared to those obtained by other methods. The relationship between impedance measurement and the relative humidity (RH) gave good linearity. This powder showed good sensitivity and reproducibility, as well. In addition, it was found that the microstructure of pellets, namely the pore size distribution and total porosity, affected their conduction and humidity response.