Thammanoon Thaweechai 2010: Structural Characteristics and Gas-sensing Properties of Sr(II) and Co(II) Doped $LaFeO_3$ Perovskites Prepared by Thermal Decomposition of Metal-organic Complexes. Master of Science (Chemistry), Major Field: Chemistry, Department of Chemistry. Thesis Advisor: Assistant Professor Nattamon Koonsaeng, Ph.D. 101 pages.

Sr(II) and Co(II) doped $LaFeO_3$ perovskite compounds were successfully prepared by the thermal decomposition of metal-organic complexes which were synthesized from the reaction of $La(NO_3)_3.6H_2O$, $Fe(NO_3)_3.9H_2O$ and $N(CH_2CH_2OH)_3$ at 190 ºC in ethylene glycol solvent. Strontium nitrate and Cobalt chloride used as a dopant were varied in amounts as 0, 10.0, 30.0 and 50.0 mol%. The perovskite powders obtained by calcination of metal-organic complexes at 850 ºC for 4 h were characterized by FTIR, XRD, SEM and BET. The results from all characterizations exhibited that all of prepared perovskite powders were orthorhombic structure of $LaFeO_3$ phase with the crystallite sizes around 14.31-41.71 nm. The powders consisted of the agglomeration of very small, fine particles with the average secondary aggregated particle size of about 2-5 μm and the specific surface area around 7.88-18.99 m^2/g.

Based on semiconducting properties, the Sr(II) and Co(II) doped $LaFeO_3$ films prepared by spin coating were investigated for gas sensing. The results showed that all of prepared perovskites were p-type semiconductors. The doping of Sr(II) and Co(II) ions could improve the conductivity, sensitivity and selectivity of prepared sensors. The sensors doped with 50% Sr(II) exhibited the highest sensitivity to ethanol gas in the concentration range of 100-500 ppm at 350 ºC while the 10% doped Co(II) sensor showed the best response to 200-2000 ppm of acetone gas with high selectivity when compared to ethanol, methane and hydrogen gas.

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