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APPENDIX

Appendix A

Activation Energy (E_a)

Arrhenius plot of $La_{0.7}Sr_{0.3}FeO_3$ is given in Figure 3.16 (b). The linear part can be described by the small polaron conduction mechanism, following the formula:

$\sigma = (A/T) \exp(-Ea/kT)$ (B.1)

$\sigma T = A \exp(-Ea/kT)$

$\ln \sigma T = -Ea/kT + \ln A$ (B.2)

A is material constant including the carrier concentration term,

Ea the activation energy

k the Boltzmann's constant

T is the absolute temperature.

From Equation B.2 Arrhenius plot of $\ln \sigma T$ versus $1000/T$ gives a straight line, whose slope and intercept can be used to determine E_a and A.

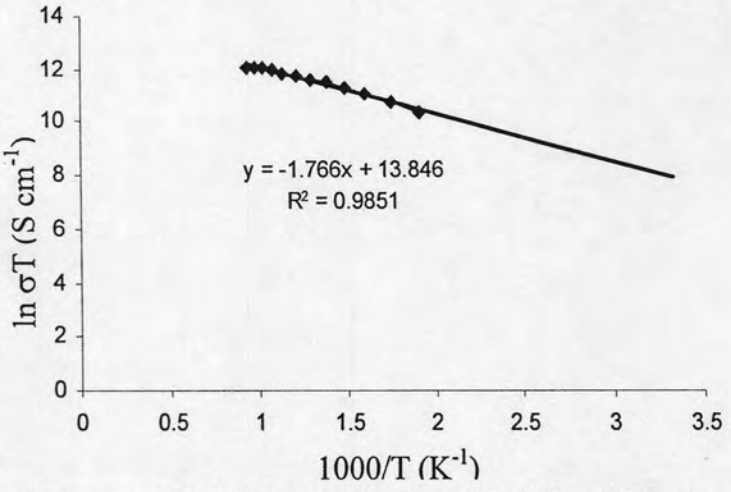

Figure A.1 Arrhenius plot of the electrical conductivity of $La_{0.7}Sr_{0.3}FeO_3$.

The activation energy calculated from the slope of the straight line of figure A.1 For example, the activation energy (Ea) of $La_{0.7}Sr_{0.3}FeO_3$, was calculated as below:

$$\text{Slope} = -Ea/k$$

$$\text{Slope} = -Ea/8.314472$$

$$Ea = -\text{slope} \times 8.314472$$

$$Ea = -(-1.766) \times 8.314472$$

$$Ea = 14.68 \text{ kJ/mol}$$

Appendix B

Relative density

Relative density of $La_{0.7}Sr_{0.3}FeO_3$ is given in Figure 3.6. It was calculated following the formula:

$$\rho = m / V$$

$$= w / (\pi \times r^2 \times h)$$

$$\rho_0 = M / N (a \times b \times c)$$

$$\text{Relative density} = (\rho / \rho_0) \times 100\%$$

Where;

ρ	= density
ρ_0	= theory density
w	= weight of perovskite membrane
r	= radius
h	= thickness
M	= molecular weight of perovskite
N	= Avogadro number (6.02×10^{23} mol^{-1})
a, b and c	= lattice parameter

For example, relative density of $La_{0.7}Sr_{0.3}FeO_3$, was calculated as below:

$$\rho = 1.7498 \text{ g/ } (\pi \times 0.804^2 \text{ cm}^2 \times 1.46 \text{ mm})$$

$$= 5.90 \text{ g/cm}^3$$

$$\rho_0 = 227.37 \text{ gmol}^{-1} / (6.02 \times 10^{23} \text{ mol}^{-1})(3.90 \text{ A})^3$$

$$= 6.37 \text{ g/cm}^3$$

So; Relative density = (5.90 / 6.37) x 100%

= 92.7 %

VITAE

Miss Nantiwat Virattayanon was born on August 5, 1984 in Bangkok, Thailand. She graduated with Bachelor's Degree in Petrochemicals and Polymeric materials from Faculty of Engineering and Industrial Technology, Silpakorn University in 2006. She continued her study in Petrochemistry and Polymer Science Program, Faculty of Science, Chulalongkorn University in 2006 and completed in 2009.

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