UNIVERSITI TEKNOLOGI MARA

THE EFFECT OF NICKEL OXIDE AS SINTERING AID ON THE DENSIFICATION OF $BaCe_{0.54}Zr_{0.36}Y_{0.10}O_{2.95}$ ELECTROLYTE

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Thesis submitted in partial fulfilment

of the requirements for the degree of

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as reference work. This thesis has not been submitted to any other academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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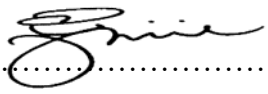
Signature of Student	:	
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ABSTRACT

This study was conducted to study the role of nickel oxide as sintering aid on the $BaCe_{0.54}Zr_{0.36}Y_{0.10}O_{2.95}$ (BCZY) electrolyte. An electrolyte with highly dense proton conducting materials of $BaCe_{0.54}Zr_{0.36}Y_{0.10}O_{2.95}$ (BCZY) electrolyte with 4 wt% nickel oxide as sintering additive used as at intermediate temperature solid oxide fuel cells (IT-SOFCs) and have been processed via a sol-gel method. The microstructure and electrical properties of the BCZY electrolyte have been investigated under scanning electron microscope SEM and its electrical characteristic by electrochemical impedance spectroscopy (EIS). The microstructural characterizations of the 4NiO-BCZY electrolyte show enhanced density of the BCZY electrolyte after nickel oxide was added. The density percentage obtained for the 4NiO-BCZY electrolyte is 93%, while the original BCZY only 90% although both of the sample sintered on same conditions which at temperature 1500 °C for 5 hours. The conductivity of 4NiO-BCZY electrolyte in this study show an increases of the conductivity values due to increasing of operational temperature. The conductivity that has been measured as 8.61×10^{-2} Scm^{-1}, 7.14×10^{-2} Scm^{-1}, 3.34×10^{-2} Scm^{-1}, 1.68×10^{-2} Scm^{-1}, 9.51×10^{-3} Scm^{-1} and 6.01×10^{-3} Scm^{-1} at 800 °C, 750 °C, 700 °C, 650 °C, 600 °C, and 550 °C respectively.

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