

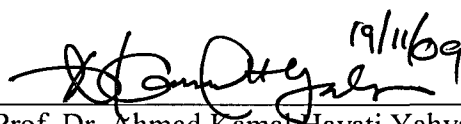
**OXYGEN SENSING PROPERTIES AND HOT SPOT TEMPERATURE
VARIATION OF $\text{HoBa}_2\text{Cu}_3\text{O}_{7-\delta}$ CERAMIC**

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**Final Year Project Submitted in
Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science (Hons.) Physics
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

NOVEMBER 2009

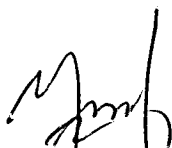
This Final Year Project Report entitled “Oxygen Sensing Properties and Hot Spot Temperature Variation of $\text{HoBa}_2\text{Cu}_3\text{O}_{7-\delta}$ Ceramic” was submitted by Noor Baizura Binti Mohamad Samirun, in partial fulfillment of the requirements for the Degree of Bachelor of Sciences (Hons.) Physics, in the Faculty of Applied Sciences, and was approved by



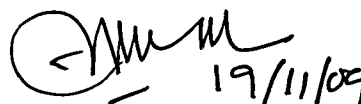
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ACKNOWLEDGEMENTS

In the name of Allah, most Merciful, most Gracious. Alhamdulillah, all praises belong to Allah. First of all, thankfulness to Allah s. w .t for giving me the good health, patience, strength and ability to manage and accomplish this final project. I would like to express thank you to Associate Prof. Dr. Yusuf Md. Theeran, Coordinator of Final Year Project, for the help and advice that he gave throughout the project. To my Supervisor, Associate Prof. Dr. Ahmad Kamal Hayati Yahya, I would like to show appreciation and thank you very much for all the knowledge, guidance, support, ideas, and advice that he gave me during undergoing and accomplishing this project. Besides, I would like to thanks my Co-Supervisor, Associate Prof. Laila Hanim Idrus, for giving me the experiences, ideas, help, and advice through my project especially in conducting the project.

Last but not least, to my beloved family, thanks a lot for your trust, prays, everlasting love and courage which always motivate me to accomplish the project successfully. Finally, I would like to grateful to all my friends for their moral support that they gave me in encouraging me to manage and finish this project.

I believe that this report will be not completed successfully without the help, moral support, ideas, advice and comments from them. Thank you very much, may Allah bless all of you.

Wassalam.

Noor Baizura Binti Mohamad Samirun

ABSTRACT

OXYGEN SENSING PROPERTIES AND HOT SPOT TEMPERATURE VARIATION OF $\text{HoBa}_2\text{Cu}_3\text{O}_{7-\delta}$ CERAMIC

The oxygen sensing properties and hot spot temperature variation of $\text{HoBa}_2\text{Cu}_3\text{O}_{7-\delta}$ (Ho123) ceramic have been successfully investigated. The mechanism of oxygen sensing and the relationship between temperatures of hot spot and oxygen partial pressure, $p\text{O}_2$ have been studied and explained. The Ho123 rod was prepared by using conventional solid-state reaction method and the current-voltage (I-V) characteristic and temperature dependence were measured by using four-point probe method and pyrometer. The oxygen partial pressures that were selected for measurement are 0%, 20%, 40%, 60%, 80%, and 100% and were controlled by changing the flow rates of O_2 and N_2 while the input voltage was increased by 0.05 V. A hot spot, which is a visible glowing spot, appears in the rod when the current reaches a peak value. The current after the appearance of the hot spot depended strongly on oxygen partial pressure. The results indicated that the relationship between hot spot temperature and oxygen partial pressure is when oxygen partial pressure increases, the temperature of the hot spot increases at all selected voltages which are at 2.35 V, 2.40 V and 2.45 V. The maximum value of hot spot temperature for each oxygen partial pressure are 630.5 °C, 697.6 °C, 729.6 °C, 746.6 °C, 750.6 °C, and 758.4 °C, respectively. The influence of oxygen partial pressure on the hot spot temperature of the sample was suggested to be related to PTCR characteristic of the sample and the orthorhombic-tetragonal structural changes. As the Ho123 sample shows higher sensitivity on lower oxygen concentration, it is suggested as a potential candidate for oxygen sensor.

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