

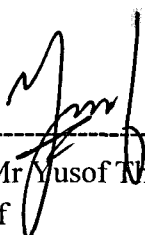
**EFFECTS OF Pr<sup>3+</sup> SUBSTITUTION ON OXGEN SENSING PROPERTIES OF Eu(Ba<sub>1-x</sub>Pr<sub>x</sub>)<sub>2</sub>Cu<sub>3</sub>O<sub>7-δ</sub> (x = 0.00 – 0.15) CERAMIC RODS USING HOT SPOT PHENOMENON**

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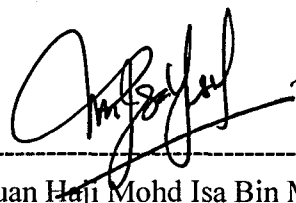
**BACHELOR OF SCIENCE (HONS)  
INDUSTRIAL PHYSICS  
FACULTY OF APPLIED SCIENCES  
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This Final Year Report entitled “Effects of Pr<sup>3+</sup> substitution on oxygen sensing properties of Eu(Ba<sub>1-x</sub>Pr<sub>x</sub>)<sub>2</sub>Cu<sub>3</sub>O<sub>7-δ</sub> (x = 0.00 – 0.15) ceramic rods using hot spot phenomenon” was submitted by Nurul Fatehah Binti Yusof, in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Industrial Physics, in the Faculty of Applied Science, and was approved by



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## ABSTRACT

### **EFFECTS OF Pr<sup>3+</sup> SUBSTITUTION ON OXYGEN SENSING PROPERTIES OF Eu(Ba<sub>1-x</sub>Pr<sub>x</sub>)<sub>2</sub>Cu<sub>3</sub>O<sub>7-δ</sub> (x = 0.00 – 0.15) CERAMIC RODS USING HOT SPOT PHENOMENON**

In this study, the effects of Pr<sup>3+</sup> substitution on oxygen sensing properties of Eu(Ba<sub>1-x</sub>Pr<sub>x</sub>)<sub>2</sub>Cu<sub>3</sub>O<sub>7-δ</sub> (x = 0.00 – 0.15) ceramic rods using hot spot phenomenon were reported. The Eu(Ba<sub>1-x</sub>Pr<sub>x</sub>)<sub>2</sub>Cu<sub>3</sub>O<sub>7-δ</sub> (x = 0.00 – 0.15) samples were fabricated using solid state method. The powdered mixtures were grind, calcined and pressed into pellet before being sintered. The pellets were then cut into rods measuring 13 mm x 1 mm x 1 mm. Substitution of Pr<sup>3+</sup> increases average grain size of samples. No structural changes were observed due to the Pr<sup>3+</sup> substitution. For substituted ceramic rods, the voltage at which hot spot appeared is lowered. The output current for all samples decreases abruptly after the appearance of hot spot. The sensitiveness to the oxygen partial pressure between 20% and 100% also increase with the substitution of Pr<sup>3+</sup>. The sensitivity increases significantly at higher pO<sub>2</sub> concentration (>80%). The stability and repeatability of the samples also improved with Pr<sup>3+</sup> substitution. From the result, it was found that the substitution of Pr<sup>3+</sup> at Ba site increases the sensitivity to the oxygen partial pressure.

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