

การพัฒนาแผ่นรองอะลูมินาเพื่อใช้ทำเพลเทียร์อิไลเมนต์

นายเปาว์ ณ นคร

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จุฬาลงกรณ์มหาวิทยาลัย

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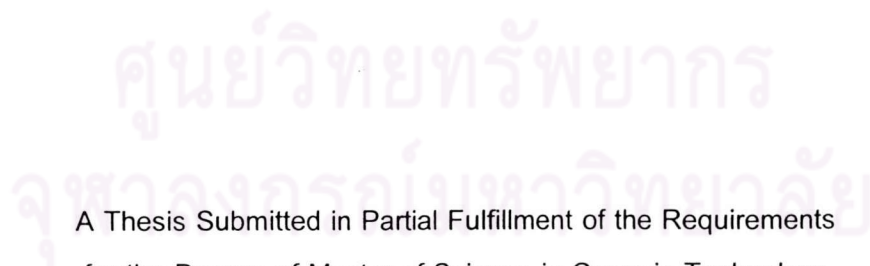
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DEVELOPMENT OF ALUMINA SUBSTRATE FOR PELTIER ELEMENT

Mr. Pao Na Nakorn



A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Ceramic Technology

Department of Materials Science

Faculty of Science

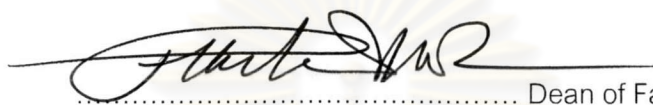
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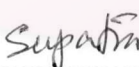
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งานวิจัยนี้เป็นการศึกษา เกี่ยวกับการนำความร้อนของแผ่นรองอะลูมินาที่เป็นส่วนประกอบของเพลเทียร์อิเลิเมนต์ โดยศึกษาเกี่ยวกับ ชนิดของผงอะลูมินา ตัวเติมแต่ง และ อุณหภูมิการขึ้นเทอร์แผ่นรองอะลูมินา ควรจะมีค่าความแข็งแรงเชิงกลที่สูง ราคาถูก และ ค่าการนำความร้อนที่ดี

ผงอะลูมินาความละเอียดสูง (AKP-30) ถูกนำมาใช้ในการศึกษาโดยมี MgO and ZrO₂ เป็นตัวเติมแต่ง การเตรียมชิ้นงานตัวอย่างเพื่อทำการทดสอบทำโดย บดผสมผงอะลูมินากับตัวเติมแต่งแล้วนำไปขึ้นรูปโดยการอัด จากนั้นนำไปเผาขึ้นเทอร์ที่อุณหภูมิในช่วง 1500 –1650 °C.

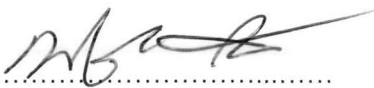
ภายหลังจากสำเร็จการศึกษาเบื้องต้นได้เลือก AKP-30 ไปทำการการขึ้นรูปเป็นแผ่นบาง โดยการรีด (Extrusion) พบว่าชิ้นงานที่ได้มีค่าการนำความร้อนสูงกว่า 30 W/m·K และค่าความแข็งแรงเชิงกลสูงกว่า 400 MPa

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ลายมือชื่อนิติต 

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The study concentrates on the research of the thermal conductivity of alumina substrate for Peltier element as a function of alumina powders, additives and sintering temperatures. Alumina substrate should have high mechanical strength and low production cost as well as good thermal conductivity. In this study AKP-30 was used as alumina powder and MgO and ZrO₂ were used as additives. Alumina powder and additives were prepared by a conventional oxide mixing technique and sintered at temperature ranging from 1500 –1650 °C.

After performing the preliminary experiment, pure AKP 30 was selected as the powder for fabrication of thin tape by extrusion technique. The thermal conductivity of the AKP-30 specimens obtained was over 30 W/m•K and their mechanical strength of AKP-30 was higher than 400 MPa.

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จุฬาลงกรณ์มหาวิทยาลัย

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