FINAL PROJECT

THE EFFECT OF REACTANT COMPOSITIONS ON THE MICROSTRUCTURE OF CERAMIC MATERIALS FORMED BY COMBUSTION SYNTHESIS

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IN AUTOMOTIVE/MOTORCYCLE ENGINEERING
MUHAMMADIYAH UNIVERSITY OF SURAKARTA
2014

DECLARATION OF RESEARCH AUTHENTICITY

I assert verily that the research entitles:

THE EFFECT OF REACTANT COMPOSITIONS ON THE MICROSTRUCTURE OF CERAMIC MATERIALS FORMED BY COMBUSTION SYNTHESIS

That made to fulfill some of requirement to get Bachelor Degree of Engineering in Automotive Department of Muhammadiyah University Surakarta, as far as I know it is not a plagiarism of research that has been published, except the information source which used to solve the problem.

Surakarta, December 2014

Researcher,

Ramzul Irham Riza

APPROVAL

The final project entitles **"THE EFFECT OF REACTANT COMPOSITIONS ON THE MICROSTRUCTURE OF CERAMIC MATERIALS FORMED BY COMBUSTION SYNTHESIS"**, has been approved by supervisor and authorized by Director of International Program as partial fulfillment of the requirements for getting the Bachelor Degree of Engineering in Automotive Department of Muhammadiyah University of Surakarta.

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Date : 27 December 2014

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VALIDATION

The Final Project entitled **"THE EFFECT OF REACTANT COMPOSITIONS ON THE MICROSTRUCTURE OF CERAMIC MATERIALS FORMED BY COMBUSTION SYNTHESIS"**, has been defended in front of examiners team and approved as a partial fulfillment of the requirements for getting the Bachelor degree of Engineering in Automotive Department of Muhammadiyah University of Surakarta.

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THE EFFECT OF REACTANT COMPOSITIONS ON THE MICROSTRUCTURE OF CERAMIC MATERIALS FORMED BY COMBUSTION SYNTHESIS

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ABSTRACT

Ceramics have been attractive as advance materials for high temperature applications due to their advantages such as high modulus, high hardness, high melting temperature, and high corrosion resistance. Of a broad range of ceramics, titanium carbide and aluminide have developed into one of the most interesting ceramics since they have high strength and good wear resistance at elevated ceramic materials. Producing TiC-Al_2O_3 from economical material (TiO_2) is less expensive than that from their elemental powders. The combustion synthesis (CS) process offers significant advantages to fabricate TiC-Al_2O_3 since it produces high exothermic reaction and takes a short processing time. The objective of this study was to explore the combustion synthesis of TiC-Al_2O_3 and investigate the effect of reactant compositions on the combustion process and microstructure of synthesized products. The combustion synthesis was carried out in a combustion chamber with an atmospheric condition. The ignition technique to initiate the CS was performed using an arc flame. The microstructure and mechanical properties of synthesized products were observed. The result of this research would benefit for producing a high performance ceramic material obtained from economical material with an efficient process.

Keywords: Ceramics, TiC-Al_2O_3, TiO_2, Combustion synthesis, Arc flame, Microstructure

MOTTO

Imaging my word, I read the meaning, I tied in paragraph, I frame in chapter a number of five, and it become a masterpiece, I received a bachelor's degree, parents, fiancée and future in-laws were happy.

I came, guidance, examination, revision, and I won.

I am thankful to all those who said NO to me, It is because of them I did it myself. (Albert Einstein)

Real friend is one who grabbed your hand and touches your heart. (Heather Pryor)

We pray when troubles and in need of something, we should also pray in great excitement and abundant sustenance. (Khalil Gibran)

I can accept failure, everyone fails at something but I cannot accept not trying (Michael Jordan)

The lack of confidence that make people afraid to face the challenges, and I believe in myself. (Muhammad Ali)

Work like do not need money. Love like never hurt. Dance like no one watching. (Mark Twain)

DEDICATION

This Research Paper is dedicated to

Allah SWT,

Thanks for the best everything You have given for me and thanks for your love that make me never give up to do the best. I believe that you will always give me the best for everything.

My Beloved Dad and Mom,

Dr. Irwandi,M.Pd and Dra. Ratna Eliza

Thanks for your pray, love, support, and affection. You always give me happiness but I often made you disappointed. I am sorry and I promise to give you the best in the future.

All of my classmates (Automotive 2010),

Thanks to all of you for giving me valuable experience for along 4 years.

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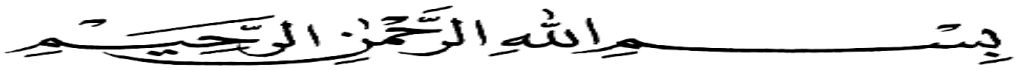

Assalamu'alaikum Warohmatullahi Wabarokatuh

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10. Those who cannot be mentioned one by one, writer want to say thanks and appreciation to all of them.

The writer realize that this research is far from being perfect, so the writer sincerely welcome any constructive comment, critics, and suggestion from anyone.

Wassalamu'alaikum Warohmatullahi Wabarokatuh

Surakarta, December 2014

Writer

Ramzul Irham Riza

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