RESEARCH PROJECT

MODIFICATIONS OF NANOCRYSTALLINE CELLULOSE WITH CHITOSAN FOR CONTROLLED RELEASE OF DRUG

Submitted by:

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DEPARTMENT OF CHEMICAL ENGINEERING

FACULTY OF ENGINEERING

WIDYA MANDALA CATHOLIC UNIVERSITY

SURABAYA

2016

LETTER OF APPROVAL

The research entitled:

Modifications of Nanocrystalline Cellulose with Chitosan for Controlled Release of Drug

Which was conducted and submitted by:

Name : Lewi Peter Richardo

NRP : 5203013014

has been approved and accepted as one of the requirement for **Bachelor of Engineering** degree in Chemical Engineering Department, Faculty of Engineering, Widya Mandala Surabaya Catholic University by following supervisor/s and has been examined by the committees on May, 19th 2016.

Surabaya, June 1st 2016

Supervisor	Co-Supervisor
Ir. Suryadi Ismadji, Ph.D.	Aning Ayucitra, M.Eng.Sc.
NIK. 521.93.0198	NIK. 521.03.0563

The Committees

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Dra. Adriana Anteng Anggorowati, M.Si.	Ir. Suryadi Ismadji, Ph.D.
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Authorized by

Dean of Engineering Faculty	Head of Chemical Engineering Department
Ir. Suryadi Ismadji, Ph.D.	Wenny Irawaty, Ph.D.
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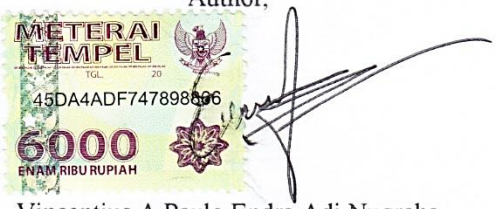

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PREFACE

The authors would like to thank God for His blessing that the Research Project entitled Modifications of Nanocrystalline cellulose with Chitosan for Controlled Release of Drug has been accomplished. This report is a prerequisites in achieving Bachelor of Engineering degree in Chemical Engineering.

The writers realize that the completion of this report is achieved by the help of many people. There for, the writers would like to thank the persons below:

1 Ir. Suryadi Ismadji, Ph.D., as Principal Supervisor and Aning Ayucitra, M.Eng.Sc., as Co-Supervisor
2 Dra. Adriana Anteng Anggorowati, M.Si, as Head of the Committees, Felycia Edi Soetaredjo, Ph.D. and Sandy Budi Hartono, Ph.D. as members of committees
3 Ir. Suryadi Ismadji, Ph.D. as the Head of Chemical Engineering Process Laboratorium and Dra. Adriana Anteng Anggorowati, M.Si. as the Head of Chemical Analysis Laboratorium
4 Mr. Novi as laborant of Chemical Engineering Process Laboratorium and Mr. Pudjo as laborant of Chemical Engineering Operation Laboratorium
5 Ir. Suryadi Ismadji, MT, Ph.D., as Dean of Engineering Faculty
6 Wenny Irawaty, ST., MT. Ph.D., as Head of Chemical Engineering Department
7 Our parents and family who have given a lot of help and support, both materially and morally.
8 Our lecturers, friends and also those who are too many to be listed by name that had contributed their kind assistance

The authors realize that this report is far from perfect, therefore any critics and comments which will better improve the research is gladly accepted. Lastly the authors hope that the report will be useful to all readers who need information regarding the research of the report.

Surabaya, June 1st 2016

The authors

ABSTRACT

A new drug carrier with specific ability are studied by many researchers. Many drug carrier are using materials such as nanocrystalline cellulose and chitosan. By combining these materials, a new ability will be formed. *Cerbera manghas* as cellulose source will be delignified, bleached and hydrolyzed to produce nanocrystalline cellulose (NCC) and then Chitosan with certain mass ratio will be grafted onto NCC surface by mixed it for 12 hours and known as nanocomposite. Nanocomposite solution will be dried and the used for drug loading and release experiment. The result of this study was nanocrystalline cellulose with promising characteristic was found with sulfuric acid 60 wt.% at 30˚C and then used as NCC for nanocomposite preparation. Amoxicillin used as drug model adsorped by nanocomposite made from nanocrystalline cellulose modified with chitosan, the ration were 2:1, 1:1, and 1:2. These composite took about 150 minutes to adsorp and less than 10 hours to release the drug. Cellulose from *Cerbera manghas* characterized by TGA, while NCC and nanocomposite were characterized by using FTIR, SEM and XRD. The drug solution and SBF were characterized by using UV-Vis Spechtrophotometer.

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