RESEARCH PROJECT

MODIFICATION OF NANOCRYSTALLINE CELLULOSE WITH NATURAL SURFACTANT FOR CONTROLLED RELEASE OF DRUG

Submitted by:

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SURABAYA

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LETTER OF APPROVAL

Seminar of **RESEARCH PROJECT** for student with indentity below :

Name : Vania
NRP : 5203015022

has been conducted on May 25th 2018, therefore the student has fulfilled one of several requirements to obtain **Bachelor of Engineering** degree in Chemical Enginnering Department, Faculty of Engineering, Widya Mandala Catholic University Surabaya.

Surabaya, June 5th 2018

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PREFACE

The authors would like to thank God for His blessing that the Research Project entitled Modification of Nanocrystalline Cellulose with Natural Surfactant for Controlled Release of Drug has been accomplished. This report is a requirement to achieve Bachelor of Engineering degree in Chemical Engineering. The authors realize that the completion of this report is achieved by the help of many people. Therefore, the author would like to thank the person below:

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6. Ir. Suryadi Ismadji,Ph.D., IPM. as Dean of Engineering Faculty.
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 for from perfect, therefore any critics and comments that will improve the research to be

better 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 5th 2018

The authors

ABSTRACT

Due to its excellent properties, nanocrystalline cellulose (NCC) has significant potential applications for various kinds of processes. One of the applications is for biomedical use is as drug carrier because of its biocompatibility, biodegradability and low toxicity. Due to the very large surface area as a consequence of nano dimension and negative charge on the surface of NCC, large amounts of drugs can be loaded to the surface of this material, and optimal of drug release can be achieved. Due to this excellence, NCC is a potential candidate to replace the conventional drug carrier, microcrystalline cellulose (MCC).

Drug carrier should have high adsorption and desorption ability. To improve the drug loading capability, rarasaponin extracted from *Sapindus rarak DC* was employed as a surfactant for NCC modification with ratio 1:11, and 1:22 (rarasaponin:NCC). In this research, NCC was obtained from Whatman No.1 filter paper as the cellulose source using sulphuric acid as a hydrolyzing agent. NCC-rarasaponin was analyzed using FTIR and zeta potential analyzer to study its characteristics. The result indicates that modified NCC can adsorp tetracycline in greater amount than unmodified NCC, as evidenced by the adsorption capacity (q_m) which is 6.1141, 9.3750, and 11.8750 mg/g (at 30°C) for NCC, 1:11, and 1:22 (w/w) rarasaponin:NCC respectively. The adsorbed tetracycline was released slowly and reached equilibrium at 14 hours, where the desorption efficiency is 18.28% at pH 3 and 55.49% at pH 7.

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