

SKRIPSI

**SYNTHESIS OF SILICON NANOPARTICLE WITH ADDITION
OF CURCUMIN AND THEIR APPLICATION FOR DRUG
DELIVERY**



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PREFACE

We wish to give praise and thanks towards the Good Lord for its His grace that allows us to complete our scientific research in thesis form to complete one of the requirements for fulfilling the curriculum to obtain the Bachelor of Engineering degree in the Chemical Engineering Study Program at Widya Mandala Catholic University, Surabaya. The title of the Thesis, "Synthesis of Silicon Nanoparticles with Addition of Curcumin and Their Application for Drug Delivery", with contents which includes the introduction, literature review, research methods, results & discussions, conclusions & suggestions, bibliography.

We would like to thank all the parties who has helped in the process of completing this thesis, especially towards.

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This thesis that we have assembled is certainly not without its errors & weaknesses, so we hope to receive advice and criticism that would assist in improving the quality of the research and thesis in the future. It is hoped that the readers adhere to the principles of implementation, suitability, and flexibility, with reference to developments in science and technology. So, hopefully this thesis can be useful for all of us.

ABSTRACT

Silicon has become one of the main resources to be researched and modified into a much efficient products for various applications. In this research, silica particle is synthesized by the bottom-up method using sugar with the addition of curcumin as reducing agent and stabilizing agent. Silicon nanoparticles synthesized through the bottom-up method using the materials such 10 ml of Tetra-Ethyl Orthosilicate (TEOS) and 0.5 grams of glucose in 100 ml of water and irradiated using microwave for 30 minutes at 70°C. With the addition of curcumin into the variable, glucose used are instead change into 0,45 g and 0,05 g of curcumin with the rest are the same number of materials and tested at various temperatures at 50, 70, and 90°C by microwave irradiation for 30 minutes. The most optimal conditions were found in 90°C with the amount particles produced up to 379,4 mg. Characterization for the silicon nanoparticles were analyzed with instruments X-Ray Diffraction (XRD) to analyze the silicon's crystallinity and particle sizes. The XRD readings shows that the sharp particle peak at 22,2327 which indicates the presence of high crystallinity silica particles along with the particle size of 0,25 nm by the Scherrer's equation. From the many adsorptions studies the drug tested in this report will be the non-steroid anti-inflammatory drug: sodium diclofenac. Kinetics for the silica particles from the combination of curcumin and glucose (SP-GC) provides a high adsorption capacity up to 73,9% and higher adsorption capacity at 50°C up to 77,4%. The kinetic study which displays the most fitting result for the silica nanoparticles adsorption towards sodium diclofenac is the Elovich model and Bhattacharya-Venkobachar equation model. In the release study, SP-GC tends to have a burst release up to 27.2% until 30 minutes and slows down releasing up to 84% after 5 hours and lastly continues to release slowly up 96.8% at 25 hours giving the therapeutic effect for a long time.