

**PHOTOLUMINESCENCE STUDY OF POROUS SILICON(PS) DOPED WITH
COPPER(CU)**

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TABLE OF CONTENTS

| | Page |
|--|-------------|
| ACKNOWLEDGEMENTS | iii |
| TABLE OF CONTENTS | iv |
| LIST OF FIGURES | vi |
| LIST OF ABBREVIATIONS | viii |
| ABSTRACT | ix |
| ABSTRASK | x |
| | |
| CHAPTER 1 INTRODUCTION | |
| 1.1 Background | 1 |
| 1.2 Problem statement | 3 |
| 1.3 Objectives | 3 |
| 1.4 Significant of study | 4 |
| | |
| CHAPTER 2 LITERATURE REVIEW | |
| 2.1 Structure of porous silicon | 5 |
| 2.2 Porous silicon doped with copper | 12 |
| 2.3 Photoluminescence and Atomic Force Microscopy(AFM) | 17 |
| | |
| CHAPTER 3 METHODOLOGY | |
| 3.1 Introduction | 30 |
| 3.2 Sample preparation | 32 |
| 3.3 Preparation of porous silicon | 33 |
| 3.4 Preparation of porous silicon doped with copper | 35 |
| 3.5 Samples Characterization | 38 |
| 3.5.1 Photoluminescence | |
| 3.5.2 Atomic Force Microscopy(AFM) | |

ABSTRACT

Porous silicon (PS) is a form of chemical element silicon which has introduced nano-porous holes in its microstructure, have large surface to volume. PS composed of highly interconnection matrix of nanometer size silicon crystals and the pores structure of silicon are etched into the substrate in size of nano to micro meter produced by anodization, chemical stain etching, drying porous silicon and other method. The electrochemical etching process that used in the research is to prepare samples of porous silicon (PS). Five samples are prepared. One of the sample use as a reference sample. The four PS doped with copper(Cu) using immersion process. The all samples are characterized by using Photoluminescence (PL) Spectroscopy and Atomic Force Microscopy (AFM). From the PL spectroscopy result, the reference sample(undoped) is higher intensity than the doped sample. Between the four samples are doped with Cu, one of the sample is higher at 0.025% and the lowest sample at the 0.020%. Additional, from the result AFM show that the grain size sample at 0.025% is small between the grain size at 0.020% is high. As a conclusion, the wavelength the PS doped with Cu have a red luminescence between 650-680nm. So when doped with the Cu give the best wavelength.

CHAPTER 1

INTRODUCTION

1.1 Background

Porous silicon was accidentally discovered in 1956 by Arthur Uhlir Jr. and Ingeborg Uhlir at the Bell Labs in the U.S were in the process of developing a technique for polishing and shaping the surfaces of silicon and germanium. They was found that under several conditions a crude product in the form of thick black, red or brown film were formed on the surface of the material. Porous silicon (PS) is a form of chemical element silicon which has introduced nanoporous holes in its microstructure, rendering a large surface to volume ratio in the order of $500 \text{ m}^2/\text{cm}$.

PS also composed of highly interconnection matrix of nanometer size silicon crystals and the pores structure of silicon are etched into the substrate in size of nano to micro meter produced by anodization, chemical stain etching , drying porous silicon and other method. The method of producing PS structure using electrochemical etching becomes famous because of the low cost and simplest method.