REACTIVE ION ETCHING (RIE) ETCHED WET-SILICA-ON-SILICON ANALYSIS FOR FLUID WETTABILITY

by

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APPROVAL AND DECLARATION SHEET

This project report titled Reactive Ion Etching (RIE) Etched Wet-Silica-On-Silicon Analysis for Fluid Wettability was prepared and submitted by Noor Aini Hamimah Binti Abd. Rahim (Matrix Number: 031010342) and has been found satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Engineering (Microelectronic Engineering) in Universiti Malaysia Perlis (UniMAP)

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I declare that this thesis is the result of my own research except some quotations of which I have cited the sources in the reference section. I furthermore declare that this thesis is not currently being submitted for any other degrees.

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ANALISIS PUNAR SILIKA BASAH ATAS SILIKON OLEH PUNARAN ION REAKTIF UNTUK KEBOLEHBASAHAN CECAIR

ABSTRAK

Analisis punar silika basah atas silikon oleh punaran ion reaktif lebih kepada analisis kekasaran permukaan di mana analisis di atas lapisan silika selepas punaran plasma terutamanya pada ujian titisan air tak terion untuk skop kebolehbasahan cecair. Oksida tebal diperlukan untuk tujuan punaran ion reaktif dan menghuraikan ciri punaran dan permukaan menggunakan mikroskop daya atom. Pengiraan sudut sentuh diperlukan untuk analisis kebolehbasahan cecair dengan demikian menghuraikan ciri titisan air tak terion menggunakan pemeriksaan optik. Sudut sentuh ini mestilah lebih daripada 90° untuk ciri tak basah atau kurang daripada 90° untuk ciri basah. Kesemua pengiraan sudut memberikan keputusan analisis lapisan silika yang berkaitan dengan analisis punar silika basah atas silikon oleh punaran ion reaktif. Dalam projek ini, semua sudut sentuh adalah ciri basah di mana ianya adalah jenis yang sama.

RIE ETCHED WET SILICA-ON-SILICON ANALYSIS FOR FLUID WETTABILITY

ABSTRACT

RIE etched wet silica-on-silicon analysis is more to surface roughness analysis which analysis on silica substrate after plasma etching especially on de-ionized water droplets testing for fluid wettability scope. The thick oxide is needed for RIE purpose and characterized the etching and surface profile using Atomic Force Microscope. The contact angles measurement is required for the wettability analysis thus to characterized the de-ionized water droplets profile using optical inspection. This contact angles must be more than 90° for non-wetting profile or less than 90° for wetting profile. All the entire measurements angles allowed gives the silica substrate surface analysis results that related to RIE etched wet silica-on-silicon analysis. In this project, all the contact angles are wetting profile which is homogeneous types.

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LIST OF SYMBOLS, ABBREVIATIONS OR NOMENCLATURE

θ	Contact Angle
Å	Angstrom
°	Degree
Ω	Ohm
μΩ·cm	Micro-Ohm Centimeter
μL	Micro Litre
2D	2-Dimensional
3D	3-Dimensional
AFM	Atomic Force Microscope
BOE	Buffered Oxide Etch
CCD	Charge-Couple Device
CF_4	Tetrafluoromethane Gases
CMP	Chemical Mechanical Planarization
CVD	Chemical Vapor Deposition
H_2O	Symbol of Water
HMDS	Hexamethyldisiloxane
IC	Integrated Circuit
MEMS	Micro-Electro-Mechanical-System
N_2	Symbol of Nitrogen Gases
O_2	Symbol of Oxygen Gases
PECVD	Plasma Enhanced Chemical Vapor Deposition
P3HT	Poly-3-Hexylthiophene
P-V	Power-Voltage
Ra	Average Roughness
RIE	Reactive Ion Etching
RMS	Root Mean Square
SiO_2	Silicon Dioxide
SEM	Scanning Electron Microscope

SOP	Standard Operating Procedure
STI	Shallow Trench Isolation