ANALYSIS ON THE FABRICATION OF SILICA OPTICAL MICROFIBER SENSOR COATED WITH ZINC OXIDE FOR SENSING DIFFERENT URIC ACID CONCENTRATION

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ANALYSIS ON THE FABRICATION OF SILICA OPTICAL MICROFIBER SENSOR COATED WITH ZINC OXIDE FOR SENSING DIFFERENT URIC ACID CONCENTRATION

This report is submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electronics Engineering Technology (Telecommunications) (Hons.)

by

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **Analysis on the Fabrication of Silica Optical Microfiber Sensor Coated with Zinc Oxide for Sensing Different Uric Acid Concentration.**

SESI PENGAJIAN: **2014/15 Semester 1**

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the Bachelor's Degree in Electronics Engineering Technology (Telecommunications) (Hons.). The members of the supervisory committee are as follow:

……

(Md Ashadi bin Md Johari)

……

(Chairulsyah Wasli)

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ABSTRAK

Tesis ini adalah berkaitan dengan analisa pada proses fabrikasi gentian optik silika bersaiz mikrofiber disaluti dengan zink oksida untuk mengesan kepekatan asid urik yang berbeza. Objektif tesis ini adalah untuk memfabrikasi, mendemonstrasi dan menganalisa sensor gentian optik silika bersaiz mikrofiber disaluti dengan zink oksida untuk mengesan kepekatan asid urik yang berbeza. Tesis ini juga bertujuan untuk menunjukkan keupayaan gentian optik dalam bidang bio-perubatan elektronik moden untuk penambahbaikan dalam sistem pengesanan urik asid. Gentian optik, sensor gentian optik dan ciri-ciri asid urik dikaji dengan teliti dalam tesis ini. Sensor gentian optik silika bersaiz mikrofiber telah diubah berdasarkan kepada panjang sensor itu sendiri. Larutan zink oksida digunakan sebagai pemangkin kepada sensor untuk meningkatkan kepekaannya. Asid urik yang berbeza kepekatan dianalisa dengan menggunakan isyarat optik. Akhir sekali, kepekatan asid urik yang berbeza dikesan dengan menunjukkan kuasa optik keluaran yang kemudiannya ditukar kepada unit voltan untuk menentukan kepekaan sensor. Graf voltan keluaran melawan kepekatan asid urik telah diplot dan hasilnya menunjukkan bahawa semakin panjang jarak sensor, semakin tinggi tahap kepekaan sensor. Berdasarkan kepada hasil kajian, ia menunjukkan bahawa analisa pada fabrikasi sensor mikrofiber optik bersalut dengan zink oksida untuk mengesan kepekatan asid urik yang berbeza berjaya menghasilkan sensor yang lebih peka dan tepat.

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ABSTRACT

This thesis deals with the analysis on the fabrication of silica optical microfiber sensor coated with zinc oxide for sensing different uric acid concentration. The objective of this thesis is to fabricate, demonstrate and analyze the silica optical microfiber sensor coated with zinc oxide for sensing different uric acid concentration. The thesis describes the capabilities of optical microfiber in modern electronic bio-medical field for enhancement in uric acid detection system. Fiber optic, fiber optic sensor and uric acid characteristics were studied in this thesis. The optical microfiber sensor was varied based on the length of the tapering. The zinc oxide is used as the catalyst for the sensor to increase the sensitivity. The different uric acid concentration was analyzed by using the optical signal approaches. Finally, the different uric acid concentration were sensed by indicating the optical output power which then converted to voltage unit to determine the sensitivity. A graph of output voltage versus concentration of uric acid were plotted and it shows that the longer the tapered length, the higher the sensitivity of the sensor. Based on the results, it is observed that the analysis on the fabrication of optical microfiber sensor coated with zinc oxide for sensing different uric acid concentration yields more sensitivity and accuracy.

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DEDICATION

This humble effort specially dedicated to my beloved parents, family, lecturers and friends, whose love can never be forgotten for their support, guidance and encouragement upon completing this research and thesis.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

ASE	-	Amplified Spontaneous Emission
OSA	-	Optical Spectrum Analyzer
ZnO	-	Zinc Oxide
LED	-	Light Emitting Diode
PIN	-	Positive Intrinsic Negative
APD	-	Avalanche Photo Diode
EMI	-	Electromagnetic Interference
RFI	-	Radio Frequency Interference
OMF	-	Optical Microfiber
SMF	-	Single Mode Fiber
FESEM	-	Field Emission Scanning Electron Microscopy
UV	-	Ultra Violet
PPM	-	Parts Per Million
EDFA	-	Erbium-Doped Fiber Amplifier
WDM	-	Wave Division Multiplexing
POF	-	Plastic Optical Fiber
µ	-	Micro
mV	-	Milli Volts
dBm	-	Decibel Milli

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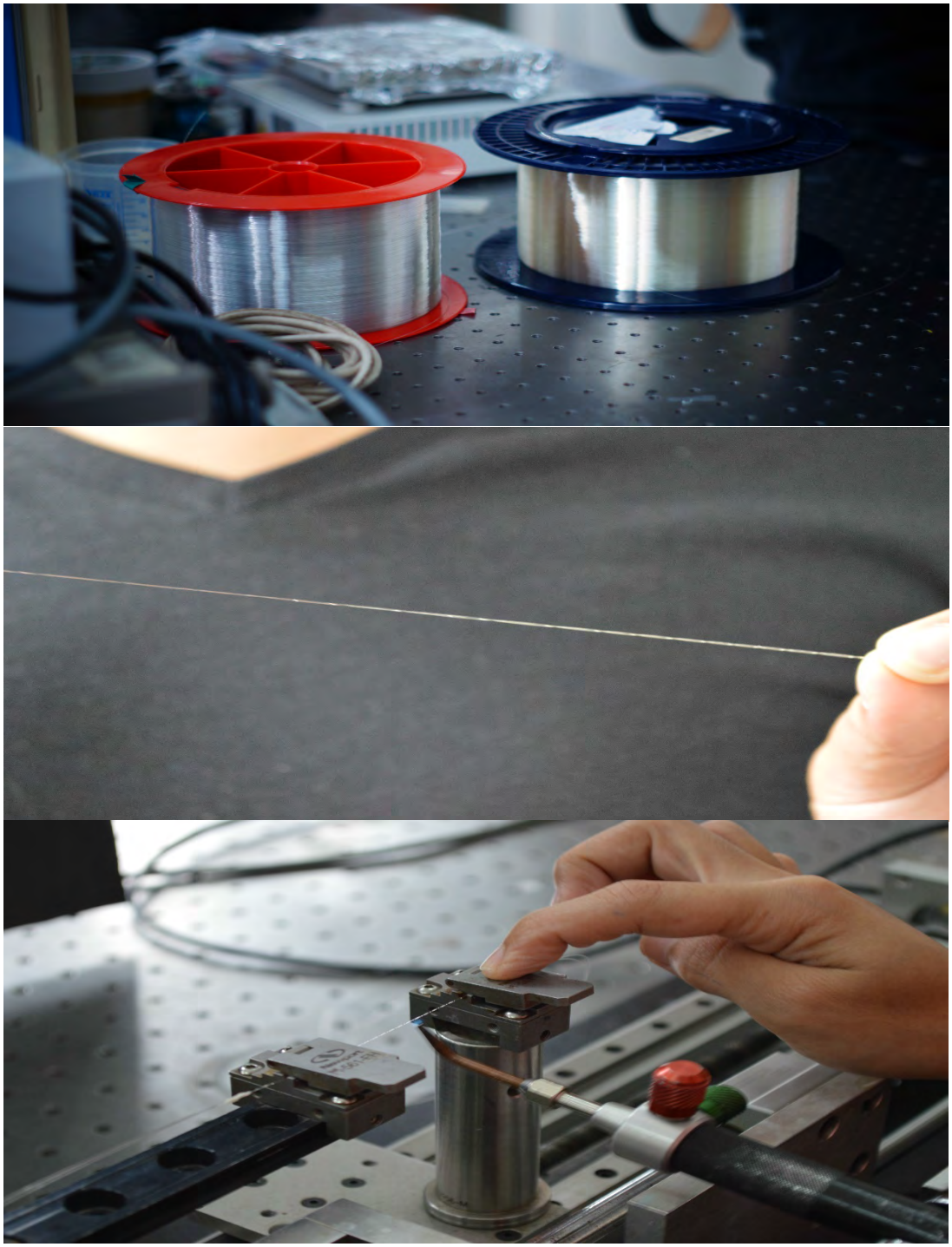
APPENDICES



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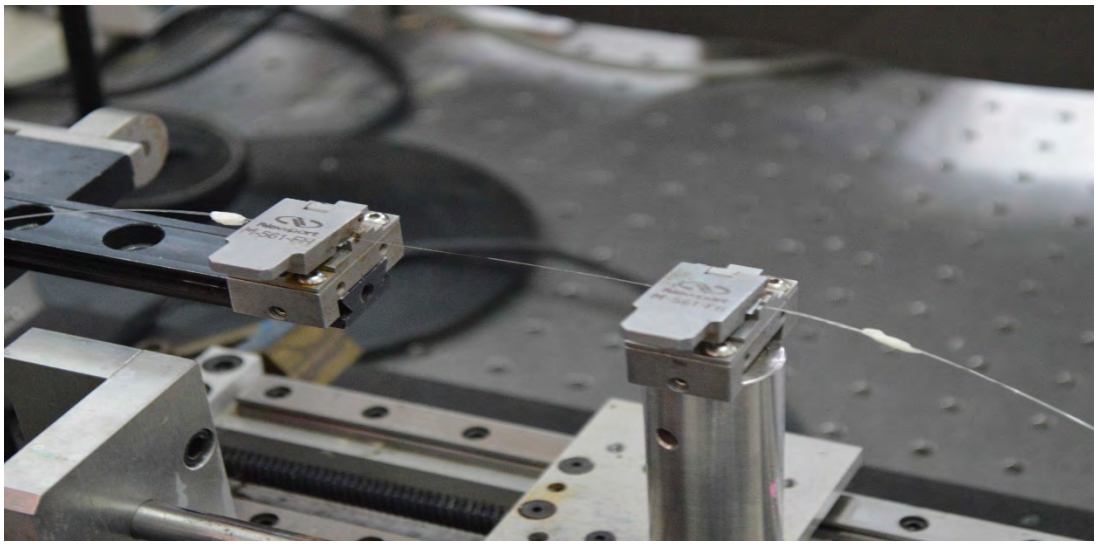

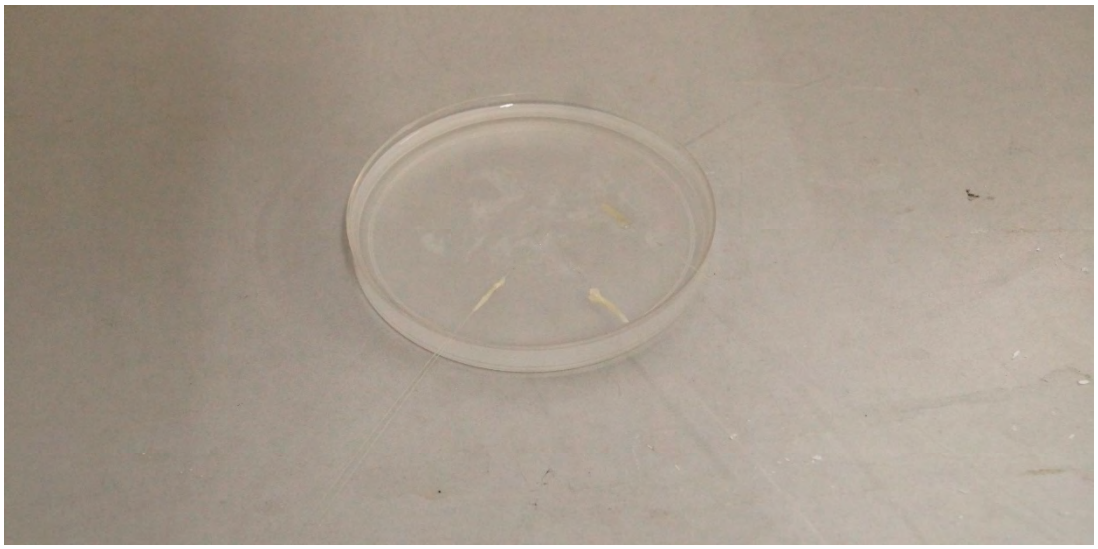

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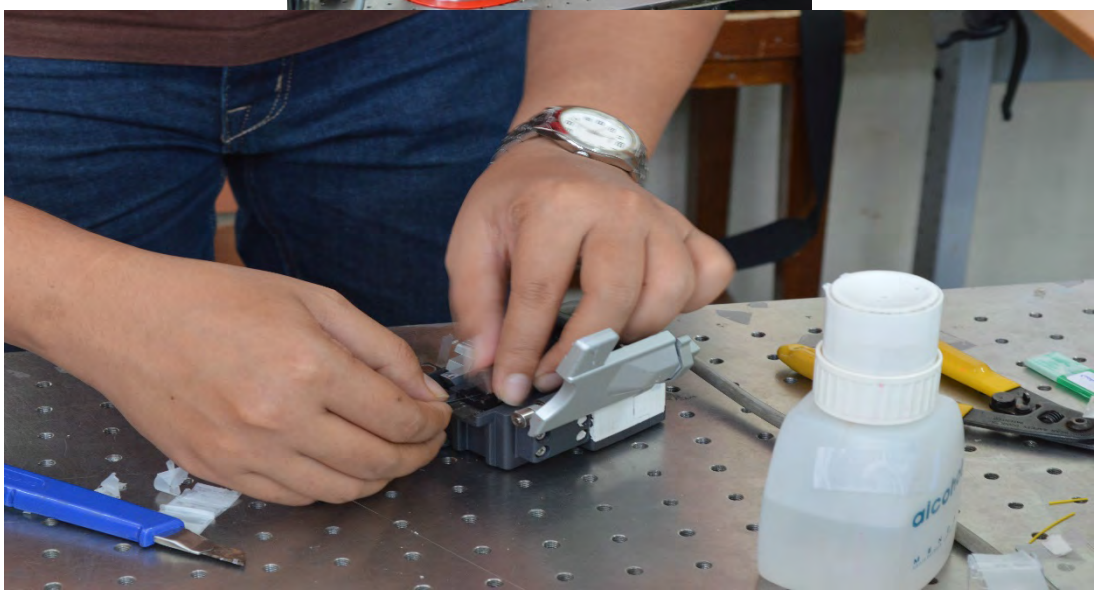

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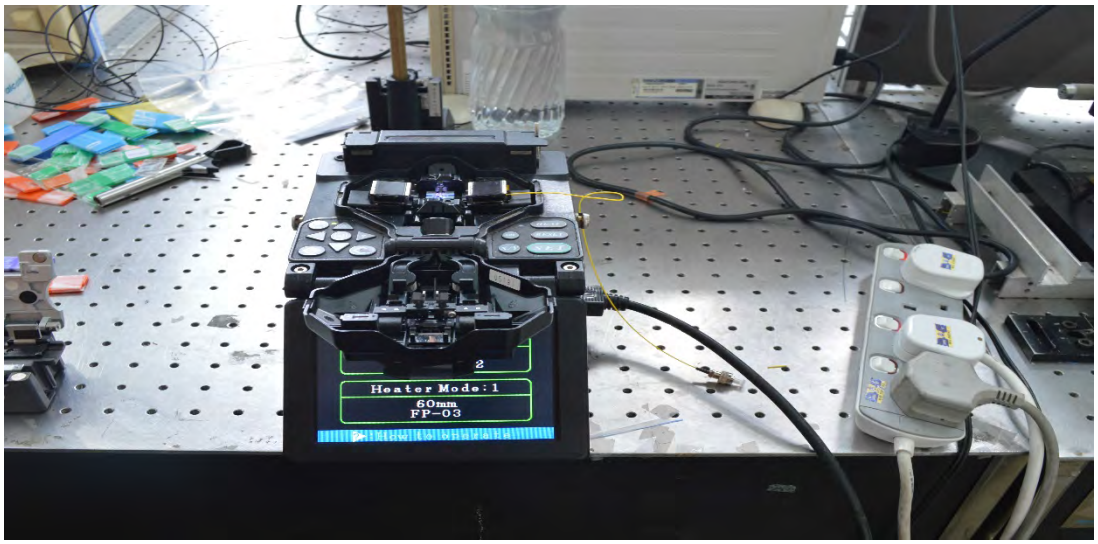

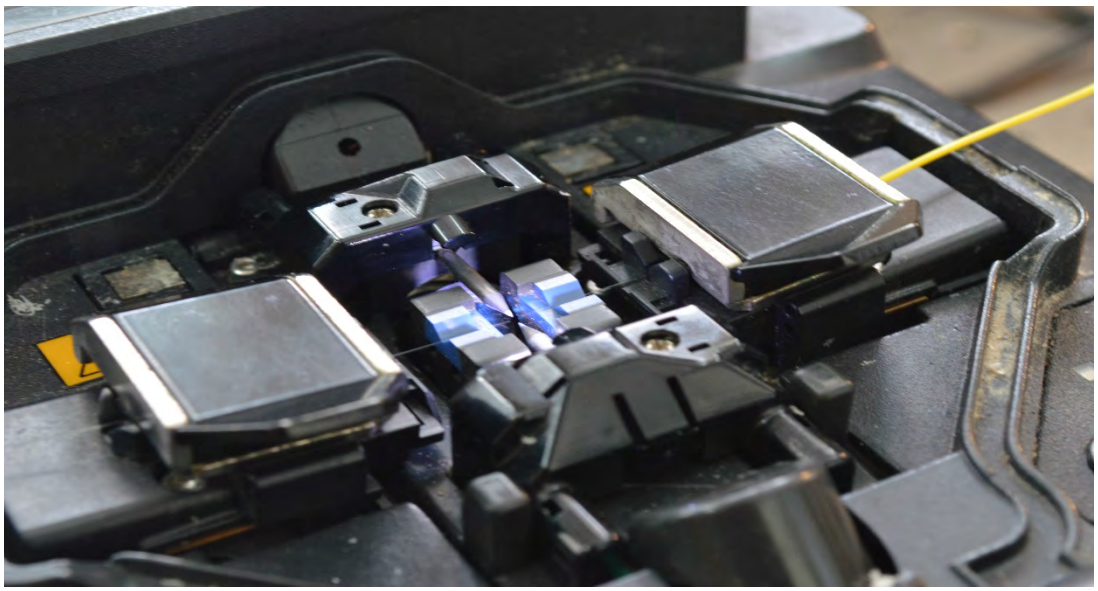

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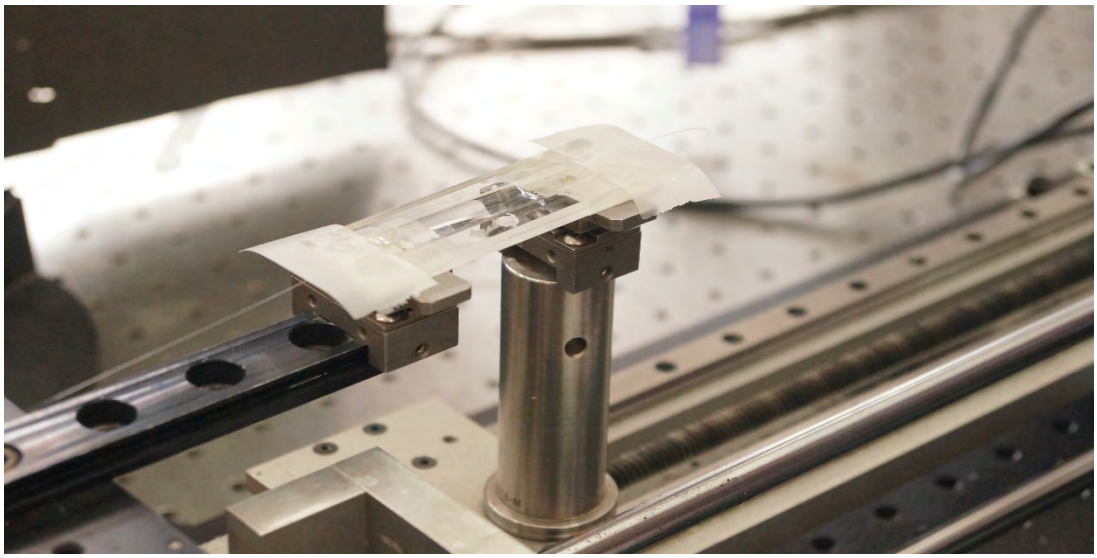

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