



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكرو فيلم

# بسم الله الرحمن الرحيم



**HANAA ALY**



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم



# شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



**HANAA ALY**



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم

# جامعة عين شمس التوثيق الإلكتروني والميكروفيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأقراص المدمجة قد أعدت دون أية تغييرات



## يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



**HANAA ALY**



# **“Effect of Different Storage Media on the Surface Roughness and Color Stability of two CAD/CAM materials”**

**(An In-Vitro Study)**

Thesis

Submitted in partial fulfillment for the requirement of Master Degree of Science in Fixed prosthodontics, Fixed prosthodontics Department, Faculty of Dentistry Ain Shams University

**By**

**Maha Waleed Mohamed**

B.D.Sc Faculty of Dentistry Misr International University (2013)  
Teaching Assistant of Fixed Prosthodontics, Fixed Prosthodontics Department, Faculty of Dentistry Egyptian Russian University

Faculty of Dentistry

Ain Shams University

2021



## **Supervisors**

### **Dr. Marwa Mohamed Wahsh**

Professor of Fixed Prosthodontics, Fixed  
Prosthodontics Department, Faculty of Dentistry  
Ain Shams University

### **Dr. Andy Karam Nassif Tawfik**

Lecturer of Fixed Prosthodontics, Fixed  
Prosthodontics Department, Faculty of Dentistry  
Ain Shams University



# Acknowledgement

First thanks are for Allah, the Most Gracious and the Most Merciful, all praises to Allah for the strengths and his blessings in completing this thesis.

I would like to express my deepest thanks, sincere respect and highest appreciation to **Dr. Marwa Mohamed Wahsh**, Assistant professor of fixed prosthodontics, Fixed prosthodontics department, Faculty of Dentistry, Ain Shams University, for her keen guidance, kind supervision, valuable advices and continuous encouragement. Whom the door to her office was always open for me whenever I ran into a trouble spot. She consistently allowed this work to flow and steered me in the right direction whenever she thought I needed it which made the completion of his work possible. Her valuable experience and honorable supervision will always be remembered with a lot of gratitude.

I would like to beautifully thank **Dr. Andy Karam Nassif Tawfik**, Lecturer of fixed prosthodontics, Fixed prosthodontics department, Faculty of Dentistry, Ain Shams University, for his highly appreciated guidance and endless support throughout this work. I cannot be prouder for being his student.

My deepest thanks and appreciation to all my dear professors, colleagues and staff members of the Fixed prosthodontics department, Faculty of Dentistry, Ain Shams University for their great support, encouragement and cooperation.

I would like to express my heartly thanks to **Dr. Khaled Tawfik**, Dean of Faculty of Dentistry, Egyptian Russian University for his great support and guidance.

I would like to express my deep thanks to my dear professor **Dr. Amina Zaki** head of Fixed prosthodontics department, my all Professors, colleagues and staff members of the Fixed prosthodontics department, Faculty of Dentistry, Egyptian Russian University for their great support.



## ***Dedication***

This work is dedicated to my Family for their continuous love, support, and great care.

### **My MOTHER**

Who supported and inspired me in every possible way and endless prayers and to whom I owe too much. Who gave me power and all of her time to complete this. She is always there for me, giving me the strength to carry on. The one who I don't know what I would have done without her. This work wouldn't have been completed without her.

### **MY FATHER**

Who is the hidden hero, my back bone, who always encourages me for his help, his constant prayers, his patience and understanding he was always there for me.

### **My Brother**

Whom I shared a lot of beautiful memories and hard times had become easier with their presence. I could not do anything without you.

### **My Uncle**

Dr. Salah Hamed Sherif for his support, help and encouragement.

### **My Fiancé**

My support system and backbone, always giving me the strength to carry on for his understanding, patience, concern, assistance and support.



## LIST OF CONTENTS

<b>Chapter</b>	<b>Page</b>
<b>LIST OF CONTENTS</b> .....	<b>i</b>
<b>LIST OF TABLES</b> .....	<b>ii</b>
<b>LIST OF FIGURES</b> .....	<b>iii</b>
<b>I. INTRODUCTION</b> .....	<b>1</b>
<b>II. REVIEW OF LITERATURE</b> .....	<b>3</b>
<b>III. STATEMENT OF PROBLEM</b> .....	<b>29</b>
<b>IV. AIM OF THE STUDY AND NULL HYPOSTHIS</b> .....	<b>30</b>
<b>V. MATERIALS AND METHODS</b> .....	<b>31</b>
<b>VI. RESULTS</b> .....	<b>51</b>
<b>VII. DISCUSSION</b> .....	<b>67</b>
<b>VIII. SUMMARY</b> .....	<b>81</b>
<b>IX. CONCLUSION</b> .....	<b>83</b>
<b>X. REFERENCES</b> .....	<b>84</b>
<b>ARABIC SUMMARY</b> .....	<b>\</b>



## LIST OF TABLES

Table	Page
1) The materials used in the study.....	31
2) Chemical composition of the IPS e.max CAD blocks .....	32
3) Instant coffee “Nescafe classic” composition: .....	33
4) Artificial Saliva Composition: .....	35
5) samples grouping .....	37
6) IPS e.max CAD crystallization parameters.....	41
7) Descriptive statistics for mean values of surface roughness (in microns) of group I before and after immersion in different storage media.....	52
8) Surface roughness of group I before and after immersion in different Storage media (in microns). .....	53
9) Descriptive statistics for mean values of surface roughness (in microns) of group II before and after immersion in different storage media .....	55
10) Surface roughness of group II before and after immersion in different storage media. (in-microns) .....	56
11) Effect of Storage media on the surface roughness of the two tested materials regarding before and after storage in solution and difference roughness. .	58
12) Descriptive statistics for color parameters for all subgroups before and after immersion in different storage media .....	60
13) Mean and standard deviation of color changes in group I (IPS e.max) after storage in instant coffee, citric acid, and artificial saliva.....	61
14) Mean and standard deviation of color changes in group II (Cersmart) after storage in instant coffee, citric acid, and saliva .....	63
15) Effect of Storage media on Color changes of the two tested materials ...	64
16) Correlation between color stability and mean difference of surface roughness .....	66

