



Republic of Iraq
Ministry of Higher Education
And Scientific Research
University of Baghdad
College of Dentistry



**EFFECT OF ADDITION OF THE INTRINSIC PIGMENT
ON SOME PHYSICAL AND MECHANICAL
PROPERTIES OF MODIFIED SILICONE ELASTOMER
WITH NANO YTTRIUM OXIDE**

A thesis submitted to the council of the College of Dentistry at the University
of Baghdad in Partial Fulfillment of the Requirements for the Degree of
Master of Science in Prosthodontics

Zainab Hassam Abd Ali

B.D.S

Supervised

Prof. Faiza M. Abdul-Ameer

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ABSTRACT

Introduction: Silicone elastomers have been widely used for constructing maxillofacial prosthesis. This study aimed to assess some biomechanical properties of VST50HD maxillofacial silicone after the addition of yttrium oxide nanoparticles and functional intrinsic pigment.

Material and method: A pilot study was done in 2 steps. First step: different percentages of nanoparticle were added to silicone and the most appropriate percentage that improves tear strength and thermal conductivity of was selected. Second step: different percentages of pigment were incorporated in a modified silicone and the two most appropriate percentages of pigment were selected after experimenting their effect on tear strength and thermal conductivity. In main study, a total of 150 specimens were prepared and divided into 6 groups according to the conducted tests (tear strength, thermal conductivity, tensile strength, elongation percentage, hardness, and surface roughness) with 30 specimens for each test. Each group was further subdivided into three subgroups: A, B, and C with 10 specimens for each subdivision. Group A represents the control group. Group B (0.5 wt% Y_2O_3 NP+ 0.2 wt% burnt sienna pigment) and group C (0.5 wt% Y_2O_3 NP+ 0.3 wt% burnt sienna pigment) represent experimental groups.

Results: There was a significant increase in tear strength and thermal conductivity between control and experimental groups and a significant increase in tensile strength and hardness between group A and B ($p < 0.05$) and a non-significant increase between group A and C ($p > 0.05$). In the elongation percentages test, there was a significant increase between group A and B ($p < 0.05$) and a significant increase between group A and C ($p < 0.05$). In the roughness test, there was a significant increase between

group A and B ($p < 0.05$) and a significant increase between group A and C ($p < 0.05$).

Conclusion: Incorporating nanoY₂O₃ and functional intrinsic pigment (burnt sienna) into maxillofacial silicone improved the tear strength, thermal conductivity, tensile strength and elongation percentages.



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والبحث العلمي
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تأثير إضافة الصبغة الجوهريّة على بعض الخصائص الفيزيائية والميكانيكية لمادة السليكون المعدل بأوكسيد اليتريوم النانوي

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بإشراف

أ. فائزة محمد حسين عبد الأمير

بكالوريوس طب وجراحه الفم والأسنان

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