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**Effect of Addition Polyamide Micro Particles and Silicone
Dioxide Nano particle composite on Some Mechanical
Properties of Room Temperature Vulcanized
Maxillofacial Silicone Elastomer after Artificial Aging**

A Thesis

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By

Bahaa F. Alanssari

B.D.S.

Supervised by

Asst. Prof. Bayan S. Khalaf

B.D.S., M.Sc.

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Abstract

The most common reason for re-making of facial prosthesis is degradation in silicone mechanical properties. This study aimed to assess some mechanical properties of VST-50F maxillofacial silicone after the addition of composite of two types of fillers (silicon dioxide nanoparticle (SiO_2) and polyamide-6 (PA-6) microparticle) with and without artificial aging.

A total of 240 samples were prepared and divided into four groups according to the conducted tests (tear strength, tensile strength, percentage elongation, shore A hardness, and surface roughness) with 60 samples for each test. Each group was then further subdivided into six subgroups, with ten samples for each subdivision. The percentages of additive fillers were 0.5% PA+1% SiO_2 and 0.25% PA+1% SiO_2 selected by pilot study. The six groups were Control group, Control/aged group, 0.5PA+1 SiO_2 group, 0.5PA+1 SiO_2 /aged group, 0.25PA+1 SiO_2 group and 0.25PA+1 SiO_2 /aged group.

One-way ANOVA showed a highly significant difference between all tested groups. The effect of the addition of PA-6 and SiO_2 to VST-50F silicone was showed an increase in tear strength, hardness and surface roughness but a decrease in tensile and percentage of elongation. The effect of artificial aging showed increased in tear strength that was a highly significant difference to control, before aging, decreased in tensile strength that was high significant difference to the control, increased in percentage of elongation that was a non-significant difference to control, decreased in hardness that was a non-significant difference to control and

last increased the surface roughness that was significantly difference to the control (P-value ≤ 0.05).

To conclude, the addition of composite of fillers into the silicone elastomer allowed enhancement of some mechanical properties (increase in tear strength, hardness and surface roughness, while decrease in tensile and percentage of elongation). The composite of different types of filler reinforcement is encouraging to improve the anti-aging properties of silicone and maintain some of the mechanical properties (increase in tear strength, Percentage of elongation, and surface roughness, while decrease in tensile strength and hardness) to enhance the service life.