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# **Effect of nano titanium oxide addition on some mechanical properties and color stability of maxillofacial silicone materials**

A thesis

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## Abstract

Despite of silicone elastomers have a desirable properties like, easy coloration, easy manipulation,, and biocompatibility, but after 4-14 months of clinical use it may deteriorte in some properties.

**Aims of this study** was to evaluate the effect of addition 0.25wt.% nano titanium dioxide( $\text{TiO}_2$ ) for VST50F room temperature vulcanizing (RTV) and 0.2wt.% for Cosmesil M511heat temperature vulcanizing (HTV) on the tear strength, hardness and tensile strength elongation percentage at breakage and to evalute the effect of nano  $\text{TiO}_2$  on color stability after addition functional intrinsinc pigment before and after artificial accelerated weathering.

**Material and method:** 180 samples were prepared by addition of 0.25wt%  $\text{TiO}_2$  nanofiller for VST50F and 0.2 wt% for Cosmesil M511 maxillofacial silicone(90 samples for each one). The main study samples were divided into four (4) groups for both silicone material , each group contains (20) samples according to the conducted tests: tear strength, hardness test and tensile strength with elongationtest, except the test of color change the group contain (30) samples. Then, each group was subdivided into two subgroups (A. control pure silicone without nano  $\text{TiO}_2$ , B. silicone incorporated with nano  $\text{TiO}_2$  ) while for color change test has subgroup (C. silicone incorporated with nano  $\text{TiO}_2$  and intrinsinc pigment ) in addition to subgroup A and B, (n= 10) samples for each subgroups. The samples were tested and the samples of color change test wre tested before and after artificial weathering(0, 15, 25, 50, 100, 150)h. All data were analyzed with a descriptive statistical analysis, two -way ANOVA interaction ANOVA way , three-way ANOVA and bonferroni test.

**Results:** The addition of 0.25wt% of  $\text{TiO}_2$  nanofiller to VST50F and 0.2wt% of  $\text{TiO}_2$  nanofiller to Cosmesil M511 maxillofacial silicone elastomers resulted in a highly significant increase ( $P \leq 0.01$ ) in mean values of the tear strength, shore A

hardness and tensile strength and elongation percentage. After artificial weathering for (15-150 hours), highly significant reduction in the color change values were seen ( $P \leq 0.01$ ), the color changes is higher in Cosmesil M511 than that of VST 50 F.

**Conclusion:** Incorporation of  $\text{TiO}_2$  nanofiller can significantly improve some mechanical properties, increase the service life of the prostheses and represent an effective tool for preparation of maxillofacial silicone materials.