

## The Effect of Silanization on Alumina for Improving the Compatibility with Poly(Methacrylic Acid) Matrix for Dental Restorative Materials

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**Abstract :** In modern dentistry, the application of resin-based composites continues to increase and in the majority of countries has completely replaced mercury amalgams. Alumina ( $Al_2O_3$ ) is a representative bioinert ceramic with a variety of applications in industry as well as in medicine. Alumina has the potential to improve electrical resistivity and thermal conductivity of polymers. The application of poly(methacrylic acid) (PMAA) in medicine was poorly investigated in the past but can lead to good results by the incorporation of alumina particles that can bring bioinertness to the composite. However, because of the differences related to chemical bonding of these materials, the interaction is very weak at the interface leading to no significant values in practical situations. The aim of this work was to modify the structure of alumina with silane coupling agents and to study the influence of silanization on the physicomaterial properties of the resulting composite materials. Two silanes were used in this study: 3-aminopropyl-trimethoxysilane (APTMS) and dichlorodimethylsilane (DCDMS). Both silanes proved to have a significant effect on the overall performance of composites by establishing bonds with the polymer matrix and the filler. All these improvements in dental adhesive systems made for bonding resin composites to tooth structure have enhanced the clinical application of polymeric restorative materials to the position that they are now considered the material of choice for esthetic restoration.

**Keywords :** alumina, compressive strength, dental materials, silane coupling agents, poly(methacrylic acid)

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