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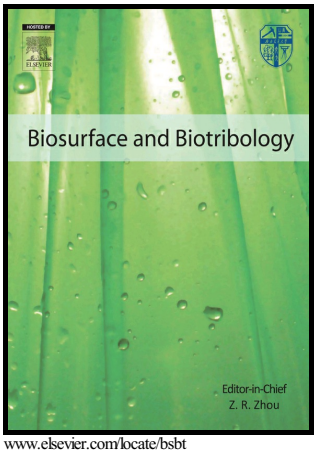

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Tribological interactions between tooth enamel and composite dental materials

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1. Introduction

Modern restorative dentistry widely uses composite restorative materials to repair different tooth defects. These materials have numerous advantages such as good cosmetics, satisfactory mechanical properties (closed to those possessed by hard dental tissues), good possibility of filling etc. Despite of these advantages, there are still two unsatisfactory features of composite materials from the tribological point of view, namely, too low resistance to wear, especially when the material is placed in posterior teeth, and causing accelerated wear of opposite teeth. In the light of the above, it is crucial to investigate tribological mutual relations between tooth enamel and composite restorative materials. Consequently, better understanding of the mentioned interactions may lead to discover new materials with better tribological characteristics.

In general, tribological interactions between tooth enamel and dental restorative materials are investigated both *in vivo* and *in vitro* conditions. Each of the methods has some advantages and disadvantages. In regard to *in vivo* there are two groups of methods of wear assessment, namely, direct and indirect methods. The first method was already implemented in the 80's of the last century [1]. Subsequently, with the emergence of new capabilities, mainly in the computer science area and laser technology, more and more accurate results were obtained. For example, optical (laser) 3-D scanners are used with a high resolution (up to 250000 points per a single tooth) and sufficient software that allows us to obtain rapid and automatic measurements. However, the precision of the measurements of linear wear ranges between 2.2 and 10 μm [2], which is not always satisfactory. This precision can be substantially improved by using proper mathematical methods of surfaces matching [3]. An interesting method of *in vivo* wear measurements of a tooth was showed in Wiskott's et al work [4]. The object of investigation was a crown made from a restorative material, placed temporarily on an implant. Owing to this solution there was a possibility of wear measurements to be conducted at any time intervals. The authors assessed the rate of precision at 5 μm.

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