NEW INITIATING SYSTEMS AND ORGANIC MATRICES FOR PHOTO-CURING DENTAL COMPOSITES

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Photopolymerization processes play an essential role in biological applications. Especially in recent years, photo-cured dental fillings obtained by photopolymerization processes have been the subject of much research. The use of photochemically initiated polymerization to obtain dental composites enables the use of unique and innovative features of this method. The most important are: (a) short curing time of the composition (up to a few seconds), (b) carrying out the reaction at room temperature, and (c) low energy consumption.

The most common initiating system for the preparation of photocurable dental composites is the system composed of camphorquinone and aromatic amine. Nevertheless, camphorquinone generates a yellow color, while amines are cytotoxic and genotoxic. The most popular materials designated for obtaining dental composites through photopolymerization are (meth) acrylate monomers (RCB - resin-based composites) characterized by high reactivity, which form an organic matrix. Nevertheless, acrylate monomers cause high polymerization shrinkage. Polymerization shrinkage in composite materials can lead to the formation of a marginal gap between the photo-cured filling and the tooth tissue, leading to micro-leakage. Therefore, new organic matrices as well as initiating systems for the production of photo-cured dental fillings are still being sought.

In this work, we present entirely new initiating systems for the production of photo-cured dental fillings. Besides, completely new organic matrices leading to the formation of an interpenetrating polymer network have been proposed. The influence of inorganic fillers on hardness and conversion rates was also investigated. Dental composites conversion rates were studied using real-time-FT-IR, while hardness was measured on the Shore scale.

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[1] M.Topa, J. Ortyl, Materials 2020, 13, 4093.