INVESTIGATION OF SPECTROSCOPIC, KINETIC AND APPLICATION PROPERTIES OF NEW PHOTOINITIATING SYSTEMS DEDICATED FOR 3D PRINTING IN THE DENTAL INDUSTRY

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The application of photochemistry to polymer and material science has resulted in the creation of complicated yet efficient systems for polymerization, polymer post-functionalization, and the fabrication of sophisticated materials. Using light to trigger chemical reaction pathways in these systems not only provides for precise control of reaction kinetics, but also allows for the implementation of complicated synthetic procedures [1]. The development of resin-based dental materials in the mid-twentieth century represented a breakthrough in restorative dentistry. Photopolymerization methods are used to cure the majority of current resin-based oral restorative biomaterials. Dental composites are aesthetically pleasant because they have a tooth-like appearance, are stable in the oral environment, are relatively easy to handle, and may be set on command by light curing [2]. The implementation of an appropriate, high-efficiency photoinitiating system is a critical aspect in photopolymerization processe and optimization of its conditions. A fundamental feature of the clinical usage of dental adhesives, composites, and sealants is the quick and effective photopolymerization of dental resins with low light exposure. Furthermore, optimized cure is one of the most important parameters that controls the polymeric material's long-term performance, affecting mechanical properties such as fracture toughness, elastic moduli, flexural strength, and hardness, as well as biocompatibility when potentially cytotoxic materials leach from the cured polymers [3].

In this work, the first studies on new initiator systems and their suitability for initiating cationic and radical photopolymerization processes were presented. The potential applicability of compositions containing the new photoinitiators in 3D printing of dental materials has also been investigated.

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References

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