OPTIMIZATION OF PRINTING PARAMETERS TO OBTAIN HIGH-RESOLUTION OBJECTS FOR THE DENTAL INDUSTRY

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Photopolymerization is a polymerization technique in which monomers or prepolymers are transformed into polymers by utilizing light radiation, often of a specified UV or Vis wavelength. During photopolymerization, the photoinitiator introduced to the reaction system becomes decomposed by light energy absorption. The ensuing free radicals or radical ions activate the monomers, which subsequently react with one other to create chemical bonds, culminating in the development of a three-dimensional polymer network [1]. Photopolymerization is frequently employed in 3D printing applications, which is used in aerospace, defence, art, and design, architecture, biology and many more, and is becoming increasingly popular in surgery and dentistry. With advances in 3D imaging and modelling technologies such as cone beam computed tomography and intraoral scanning, as well as the relatively long history of the use of CAD CAM technologies in dentistry, the technology will become increasingly important [2]. There are various advantages to using photocurable polymer materials in 3D printing for dental applications over traditional production methods. These include decreased material waste, greater design flexibility, quicker production times, as well as improved mechanical qualities in final dental restorations [1]. 3D printing technology is used in dentistry for a variety of purposes, including the creation of drill guides for dental implants, the development of physical models for prosthodontics, orthodontics, and surgery, the fabrication of dental, craniomaxillofacial, and orthopaedic implants, and the creation of copings and frameworks for implant and dental restorations [2].

In this work, potential use of compositions containing the new photoinitiators in 3D printing for broad-spectrum of dental applications, as well as the optimization of 3D printing conditions have been presented.

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