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Editorial

Biocompatible Optical Products Synthesized by Sol-Gel Technique

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Biocompatible optical products derived by sol-gel technique are used commercially in optical and biomedical applications. Optical products have the preparation capacity with a large variety of the products related with ophthalmic in situ gels. The optical coatings can be designed due to its favorable optical, magnetic, mechanical (low friction, abrasion resistance etc.), chemical (barrier for gasses), and electrical properties in optical and biomedical products. The functional behaviour of several ophthalmic products derived by sol-gel technique bases on the performance of in situ gel-forming systems that are instilled as drops into the eye. The sol-gel based optical products are favorable due to their high chemical homogeneity, low processing temperatures, and the possibility of controlling the size and morphology of particles. The durability and functionality of coatings is critically dependent on the adhesion performance between the coating layer and the underlying substrate. The synthesis of the optical semiconductor layers is preferred for the integration of the electronic and optical-devices (with thicknesses between ~ 10 nm and 1μm). The transparent conductor layers can be coated by using sol-gel technique as the transparent conductors is produced commercially with low temperature in cost effective sol-gel coating technique. The sol-gel coating technique is accepted as the useful alternative coating technique with several advantages. It is possible to change the processing conditions with the modification of the synthesis parameters at the coating of the microstructures. The sub-micron thin films with uniform thickness can be derived by using sol-gel technique [1,2].

The sol–gel synthesis of optical products based on the hydrolysis and condensation of molecular precursors is used to prepare the inorganic materials in a wide utilization range. This procedure gives sols, colloidal particles suspended in a liquid that progress through a gelation process. Hence, the increase of interest in the sol–gel based biomedical and optical products has paralleled the emergence of their features of unique hosts for a number of biologically important molecules that can be used in several biomedical applications. For optical imaging and biomedical applications, sol-gel technology has made the cost-effective connection of the vast common ground between chemistry and materials science. The main advantages of sol-gel technology are in the chemical adaptation of biomedical materials in the human body. The sol–gel approaches can be used successfully to prepare nanodimensional inorganic optical products. The optical and biomedical products can be explained at several main research categories such as the studies of silica-based sol–gel materials and non-silica-based materials for production of various fiberoptic applicators and for laser therapies, sol– gel biological materials improving biocompatibility, porous sol–gel materials in applied biomaterials researches and the optical sol–gel materials [3,4].

The versatility of the sol–gel derived materials has demonstrated the interpenetrating organic and inorganic networks which support the generation of the hybrid materials. These materials are based on the use of sol–gel approaches to combine organic and inorganic functionalities. The sol-gel technique will be used to synthesize the advanced adventive materials at the perspectives of the interface of physics and biology. The contributions of physics in sol-gel technique have indicated the active research areas in modern biology searches at the solutions of the complexity in the clinical applications. The optical design with specific optical architectures will enable to obtain of unique properties for the development of futuristic materials in clinical applications [5,6].

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