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Title: Nanostructured coatings for intraocular devices with drug delivery function

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Abstract:

Despite numerous scientific research efforts, ocular drug delivery remains a challenge for scientists due to the problems related to the current methods that are 90% based on eye drops administration. This therapeutics has some limitations such as rapid drug loss, toxic effects on ocular surfaces and poor patient compliance with the drug regimen. Due to these limitations the current research is focused on the development of newer systems for delivery of the ophthalmic drugs. Nanotechnology-based drug delivery can improve viable solutions giving multiple functionalities to the devices that are inserted in the eye. For example, glaucoma is one of the most troubling chronic diseases, globally considered the second leading cause of blindness by the World Health Organization, whose treatment requires drug administration during years or even during all life. It is therefore imperative to develop alternative therapeutics to administer the drugs into the eye.
We are developing a new strategy to deliver the drugs for the glaucoma treatment using biocompatible and nanostructured surfaces that can be used as a coating in an intraocular device. The design of these drug delivery biocompatible surfaces involves the control of its molecular structure and functionality. We have been using Scanning Tunneling Microscopy (STM) at the solid/liquid interface**[1-3]** to add the components of the monolayers, step-by-step, controlling their adsorption in real time. We used this method to built nanostructured coatings composed of glycosaminoglycans

adsorbed on Highly Oriented Pyrolitc Graphite (HOPG). Molecular resolution images were obtained during the formation of the monolayer that revealed a well-packed and organized surface. Presently, we are using these monolayers to adsorb a drug for glaucoma treatment encapsulated in a nanocarrier. Drug release kinetic studies monitored by UV-spectroscopy are underway and preliminary results suggest that this monolayer is very stable and that it is possible to control the drug release as a function of time.

References

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