Porous Photonic Crystals for Intraocular Drug Delivery

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Technology description

Summary

The treatment of eye diseases, such as age-related macular degeneration, diabetic retinopathy, uveitis, and others, has been problematic. The largest barrier to effective treatment is the difficulty of delivering the appropriate concentration of drug to the correct location in the eye for a sufficient length of time. Various solutions have been attempted, including repeated intraocular injections of drug or surgical implantation of drug-permeated material. However, these methods are impractical and present a significant risk to the patient: multiple injections are required, each carrying a finite risk of infection, and surgical procedures are cumbersome and not always effective.

Description

This invention presents two major advantages over existing ocular drug delivery technologies. First, the nanoporous silicon, or a biopolymeric cast of it, can be tailor-made for each type of drug to control the kinetics of sustained drug release such that the drug can be delivered in the eye with the optimal spatio-temporal profile over a long period of time. Further, several drugs can be delivered simultaneously, each with its own release parameters. Second, this customized nanomaterial has optical properties that allow a person to monitor drug levels in the implant without invasive procedures to the eye. The optical properties of this material change in a reproducible fashion as the concentration of drug decreases within the implant, so that one can view the implant through the iris to determine the amount of drug remaining. These properties make this an ideal material for drug delivery and non-invasive reporting of drug levels.

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