

## Ocular Drug Delivery

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### Abstract

Ocular drug delivery, although seems deceptively simple is a challenging task mainly because of the unique barriers associated with the ocular surface that impede adequate drug delivery and therapeutic efficacy. Topical drug therapy is the most accessible and noninvasive, however, its potential is limited by the ocular surface protective barriers, such as constant blinking, which can rapidly clear the eye drops from the ocular surface in a few minutes, impervious nature of the ocular surface due to tight epithelial junctions, and nasolacrimal drainage. These physiological barriers contribute to an inadequate drug delivery and reduced bioavailability of the drug to the eye. Hence, topical eye drops must be applied several times in a day, resulting in ocular side effects such as inflammation of the ocular surface and temporary blurred vision, leading to discomfort and poor patient compliance. In this direction, we have developed a broadly applicable synergistic nanowafer drug delivery system by integrating the current nanofabrication technologies with controlled release drug delivery technology to treat eye injuries, infections, dry eye related inflammation and ocular surface epithelial diseases.

This presentation describes the development of a synergistic nanowafer drug delivery system, wherein the drug carrying biomaterial and the drug are in synergy to provide an augmented therapeutic effect. The nanowafer contains arrays of drug loaded nanoreservoirs from which the drug will be released in a tightly controlled fashion for a few hours to a day. The slow drug release from the nanowafer increases the drug residence time on the ocular surface and its consequent absorption into the surrounding ocular tissue. The nanowafer is a tiny transparent disc that can be applied on the ocular surface with a fingertip and can withstand constant blinking without being displaced. The development of a synergistic nanowafer drug delivery system and its in vivo therapeutic efficacy in treating corneal angiogenesis and corneal cystinosis will be discussed in this presentation.

### Short Bio

Dr. Ghanashyam Acharya obtained his Ph.D. degree from the Indian Institute of Science, Bangalore. He worked as a JSPS research fellow at the Frontier Research System, RIKEN, Tokyo, Japan, followed by a postdoctoral research fellowship at Birck Nanotechnology Center, Purdue University. Dr. Acharya is presently an Assistant Professor in the Department of Ophthalmology and Michael E. DeBakey Department of Surgery at Baylor College of Medicine. Dr. Acharya's research program focuses on the development of translational nanomedicine and multifunctional nano drug delivery systems.