Diclofenac release from a silicon based contact lens material controlled by a chitosan/alginate coating

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Introduction

Eye drops are the most common form of ophthalmic treatment. However, these administration approach requires high drug doses which may promote undesired systemic side effects [1, 2]. Contact lenses (CLs) have been subject to an increasing interest in the past few years, being promoted as an advantageous ophthalmic therapeutic method. Their biocompatibility and prolonged contact with the eye show their effective use as a drug delivery material [2]. Nevertheless, the majority of the loaded drug in the CLs tends to be released in an initial burst.

In the present work surface modification by layer-by-layer (LbL) self-assembly process based in chitosan-alginate multilayers to control the drug release from commercially available CLs materials (Definitive 50 from Contamac Products U.K.).

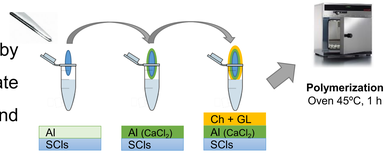
Methods

CLs drug loading

Diclofenac sodium (1 mg/mL) 38 h, 4ºC

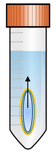
LbL coating

One Double layer was achieved by formation of layers of Alginate (crosslinked with $CaCl_2$) and Chitosan+Glyoxal.



Drug Release

Release kinetics was investigated at 36ºC in sink conditions using 3 mL of NaCl solution 130 mM per sample. The drug quantification was done using a UV-Vis spectrophotometer.



Results

Drug release

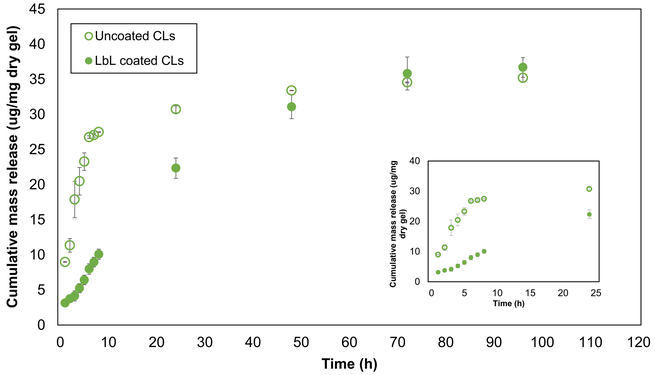


Figure 1. Cumulative release profiles of diclofenac from the CLs uncoated and coated with Al-Ch LBL.

- ✓ The drug release profile improved significantly due to the presence of the chitosan/alginate layer
- ✓ Retarding the release almost 6 times, leading to a controlled release for ≈3 days

Conclusions

The drug release profile improved significantly due to the presence of the chitosan/alginate layer: it allowed retarding the release almost 6 times, leading to a controlled release for ≈3 days.

References:

[1] Braga M. *et al.* (2011) *International Journal of Pharmaceutics* **420** (231-243).
[2] Xu J., *et al.* (2014) *Acta Biomaterialia* **6 (486-493).**

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