

Supporting information

An antibacterial collagen membrane crosslinked by the inclusion complex of β -cyclodextrin dialdehyde and Ofloxacin for bacterial keratitis

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Characterization of β -CD-DA

FT-IR spectra of β -CD, β -CD-DA were shown in the Fig. S1. There was a newly formed peak at 1734 cm^{-1} , which belonged to the contraction vibration of the C=O group, and the hydroxyl band shifted from 3422 cm^{-1} to 3435 cm^{-1} in comparison to β -CD, indicating the formation of the aldehyde group in the synthesized products. In two figures, 707 cm^{-1} for ring vibration peak, 758 cm^{-1} for sugar ring breathing vibration peak, 859 cm^{-1} for pyranoside band characteristic peak, and 948 cm^{-1} for α -1, 4 band frame vibration peak associated with the special three-dimensional structure of β -cyclodextrin were no obvious difference. The titration results (Table S1) showed that there were approximately 2 aldehyde groups in each β -cyclodextrin aldehyde molecule, indicating the successful synthesis of β -CD-DA.

Inclusion rate

UV spectra of OFLX and β -CD-DA in deionized water ($50\text{ }\mu\text{g ml}^{-1}$) was showed in Fig 4. The maximum absorption peak of OFLX was at 287 nm , and the β -CD-DA had almost no absorption peak at this wavelength. Therefore, 287 nm was selected as the detection wavelength of OFLX in the inclusion. Then, absorbance (A) value of various concentrations of OFLX was measured at 287 nm , and the regression equation and correlation value were obtained:

$$A = 0.0118C + 0.0736, R^2 = 0.9999$$

where A is the absorbance, C is the concentration of OFLX and R² is the correlation coefficient. After, the inclusion rate was calculated to be 81.2% (Table S2) according to the above formulas. There were many factors affecting the inclusion rate, such as temperature, time and the ratio of host and guest, which could be selected to obtain the optimal condition for inclusion and the high inclusion rate.

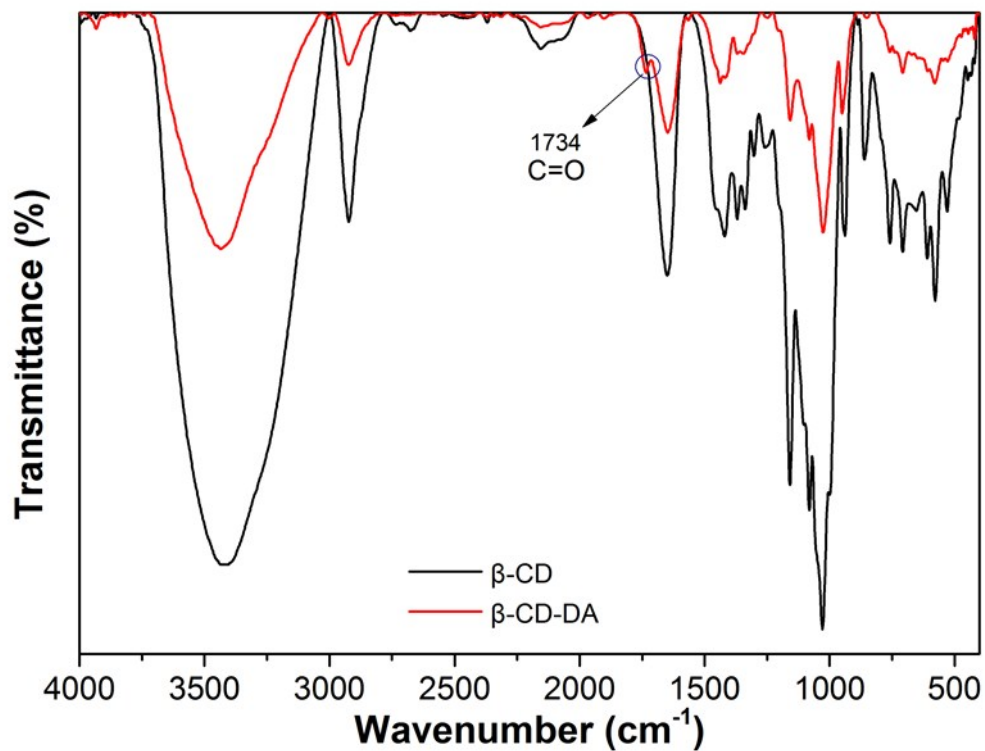


Fig. S1 FT-IR spectra of β -CD, β -CD-DA.

Table S1 The titration of number of aldehyde group in each β -CD-DA

No.	NaOH/mL	H ₂ SO ₄ /mL	Number of aldehyde group in each β -CD
1	48.87	20.00	1.99
2	48.82	20.00	1.97
3	48.93	20.00	2.01

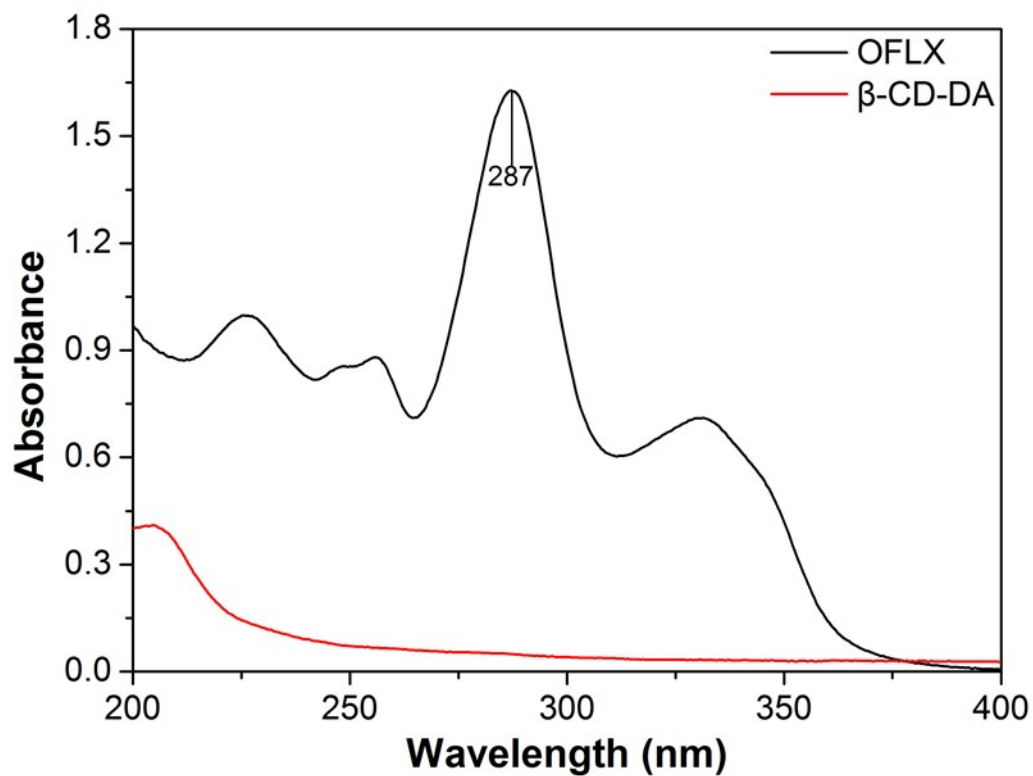


Fig. S2 UV absorption spectra of OFLX and β -CD-DA, [OFLX]=50 $\mu\text{g/mL}$, [β -CD-DA] = 50 $\mu\text{g/mL}$.

Table S2 The inclusion rate results of β -CD-DA/OFLX inclusion complex

No.	OFLX feeding amount (mg)	OFLX mass in inclusion complex (mg)	Inclusion rate (%)	Average of inclusion rate (%)	RSD (%)
1	60.0	48.6	81.0		
2	60.2	48.9	81.2	81.2	0.3
3	60.1	49.0	81.5		