Electronic Supplementary Material (ESI) for RCS Advances

Oxidized cyclodextrin-functionalized, injectable gelatin hydrogels as a new platform for tissue adhesive, hydrophobic drug delivery

Supporting Information

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Ninhydrin assay

Ninhydrin assay was used to determine the amine content of GTA polymer. Ninhydrin reagent solution was prepared by dissolving 0.35 g ninhydrin in 100 mL isopropanol. GTA solution was prepared at the concentration of 1 mg/mL. Ninhydrin and GTA solution were mixed together at the volume ratio of 1/1, and reacted at 80 – 100 °C for 15 minutes. After cooling to room temperature, the absorbance was recorded with a spectrophotometer (Jasco V-670) at a wavelength of 570 nm. The amine content was calculated using the standard curve of glycine.

To determine the amine residues of GTA and GTA-oβ-CD hydrogels, ninhydrin reagent was used. The hydrogels (200 μL) were ground and added into the glass vials. These samples was dispersed into DIW of 1 mL, then sonication was applied for 30 minutes. Ninhydrin solution (1 mL) was added into the samples and the mixture was reacted at 80 – 100 °C for 15 minutes. When the solid components in ninhydrin solution turned purple, the color intensity indicated the level of amine residues in the hydrogels.

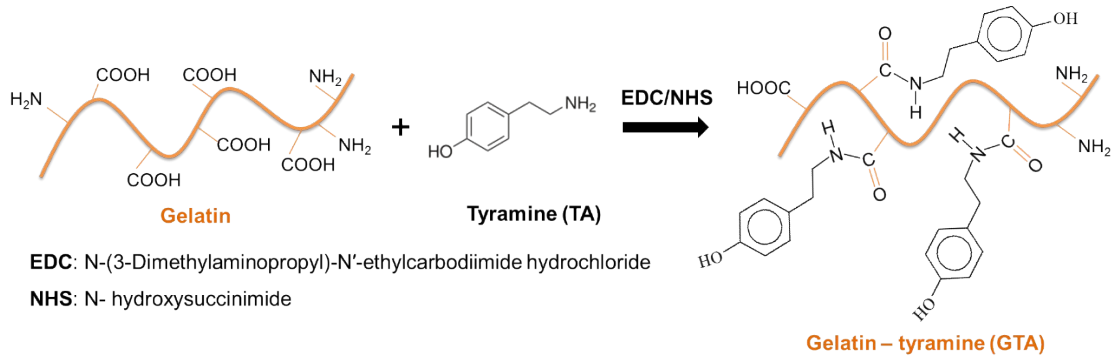

Fig. S1 Synthesis scheme of gelatin-tyramine (GTA).

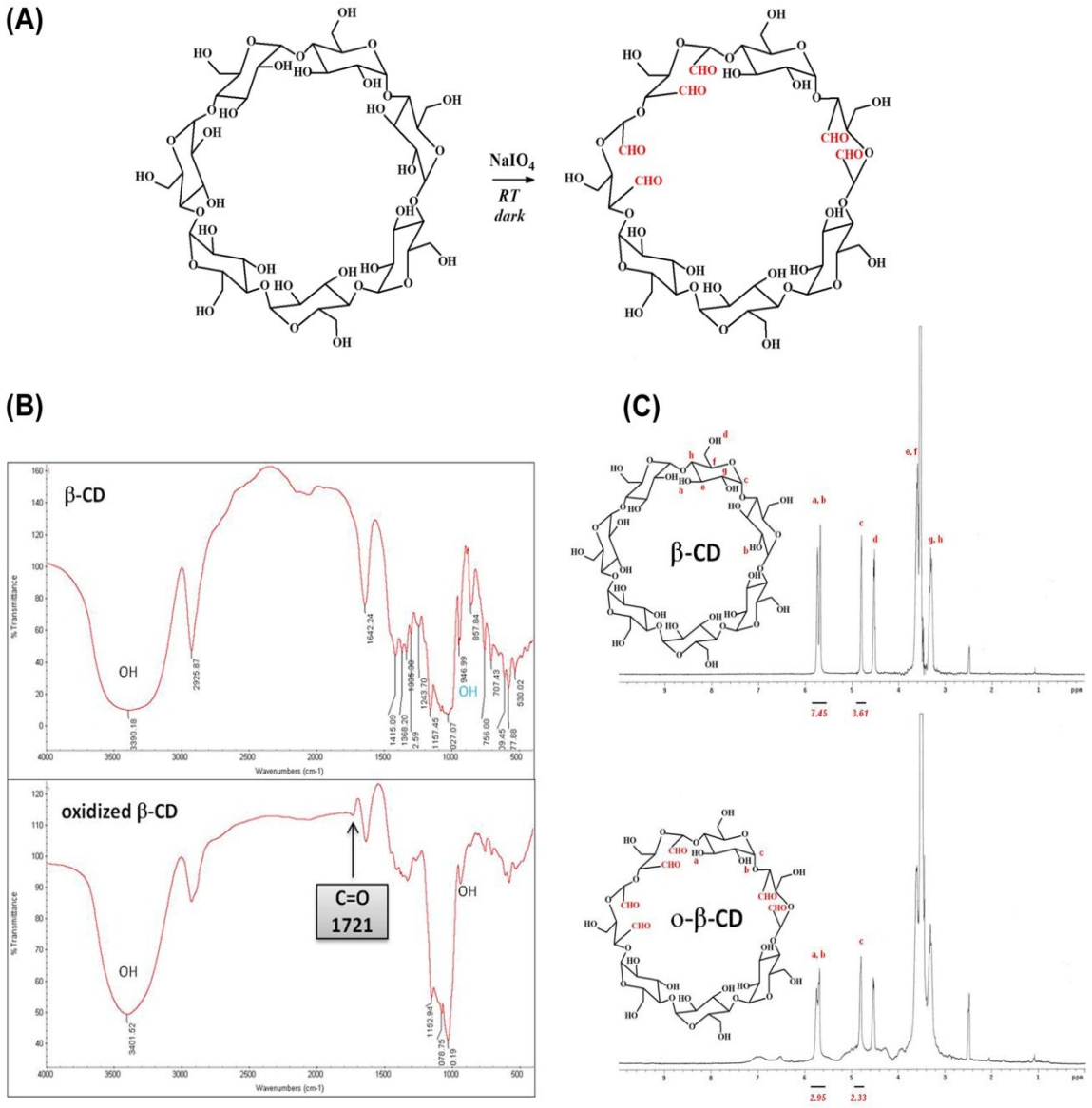

Fig. S2 Oxidation of vicinal diol groups on β-CD using sodium periodate (A). IR of β-CD and oxidized β-CD (oβ-CD), oβ-CD shows a peak at 1721 nm, confirming the presence of aldehyde groups (B). ^{1}H NMR of β-CD and oxidized β-CD in DMSO-d_6 showing the integral ratio between a peak at δ = 5.68 – 5.74 (H of secondary hydroxyl groups symbolized as a and b on the Fig.) and δ = 4.79 (H of -CH- at the c position as marked on the Fig.) was decreased after oxidation (C).

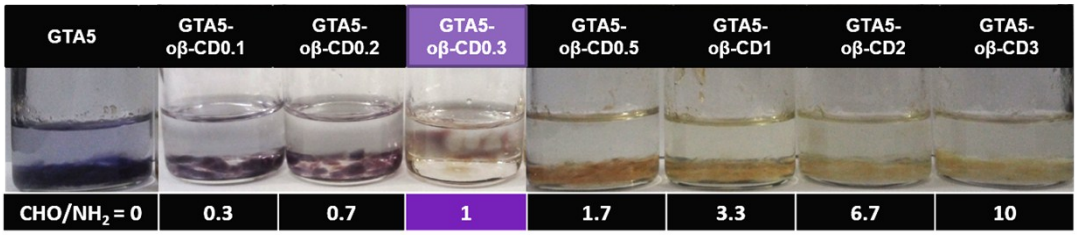

Fig. S3 Photo images of hydrogels after dyeing with the ninhydrin reagent. The purple sample shows the remaining amine groups in the hydrogel matrix, and vice versa. The hydrogels were fabricated using 5 μg/mL HRP and 0.03% H_2O_2 at room temperature, and stabilized for 30 min before adding the ninhydrin reagent.

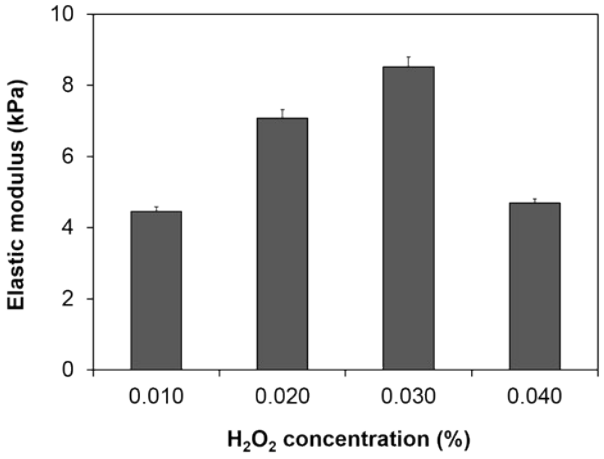

Fig. S4 Elastic moduli of GTA5-oβ-CD1 hydrogels as a function of H_2O_2 concentration

Fig. S5 Solubility of Dex and curcumin in DPBS and 6 wt% oβ-CD solution at room temperature