Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Supporting information

Biomimetic polypyrrole/hyaluronic acid electrodes integrated with hyaluronidase inhibitors offer persistent electroactivity and resistance to cell binding

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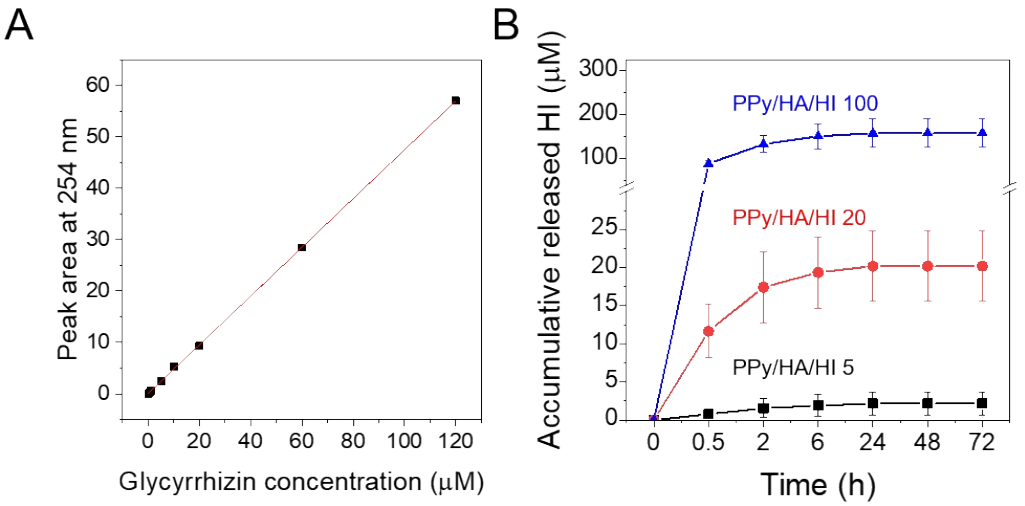

Figure S1. (A) Standard curve of glycyrrhizin with the peak area of absorbance at 254 nm, measured using high-performance liquid chromatography (HPLC). (B) Accumulative amounts of hyaluronidase inhibitor (HI) released from various PPy/HA/HI electrodes.

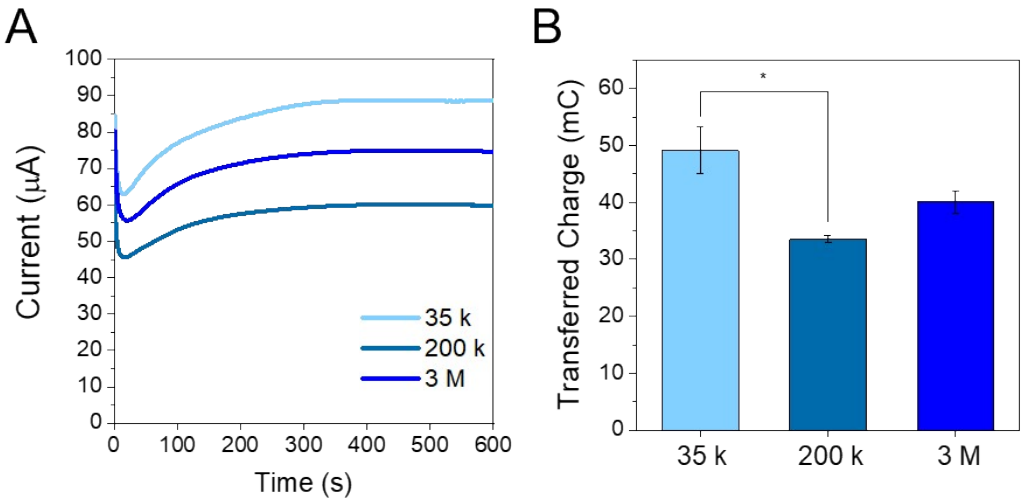

Figure S2. Electrochemical polymerization of PPy/HA on gold electrodes using hyaluronic acid (HA) of different molecular weights (MWs). (A) Current-time plots during the electrochemical polymerization of PPy/HA at a constant voltage (0.8 V versus SCE). (B) Transferred charges during the electrochemical polymerization.

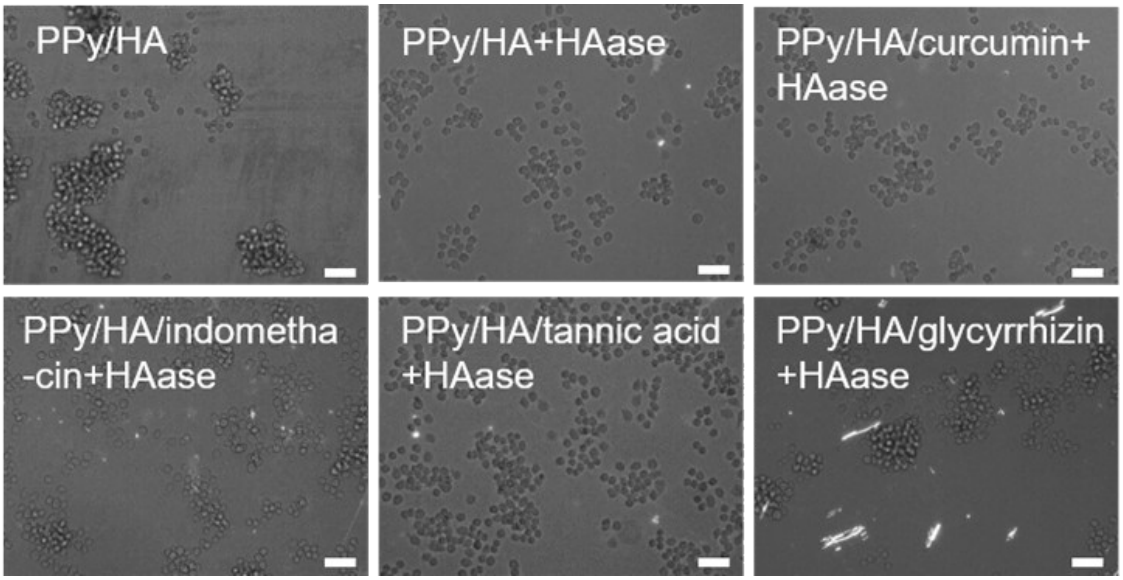

Figure S3. Screening of hyaluronidase inhibitor (HI) candidates using a cell adhesion test on PPy/HA electrodes with RAW 264.7 cells. Optical images of RAW 264.7 cells treated with hyaluronidase (HAase) (4 U/mL) on PPy/HA/HI electrodes with various inhibitor candidates, namely curcumin (Cur), indomethacin (In), tannic acid (TA), and glycyrrhizin (GL).

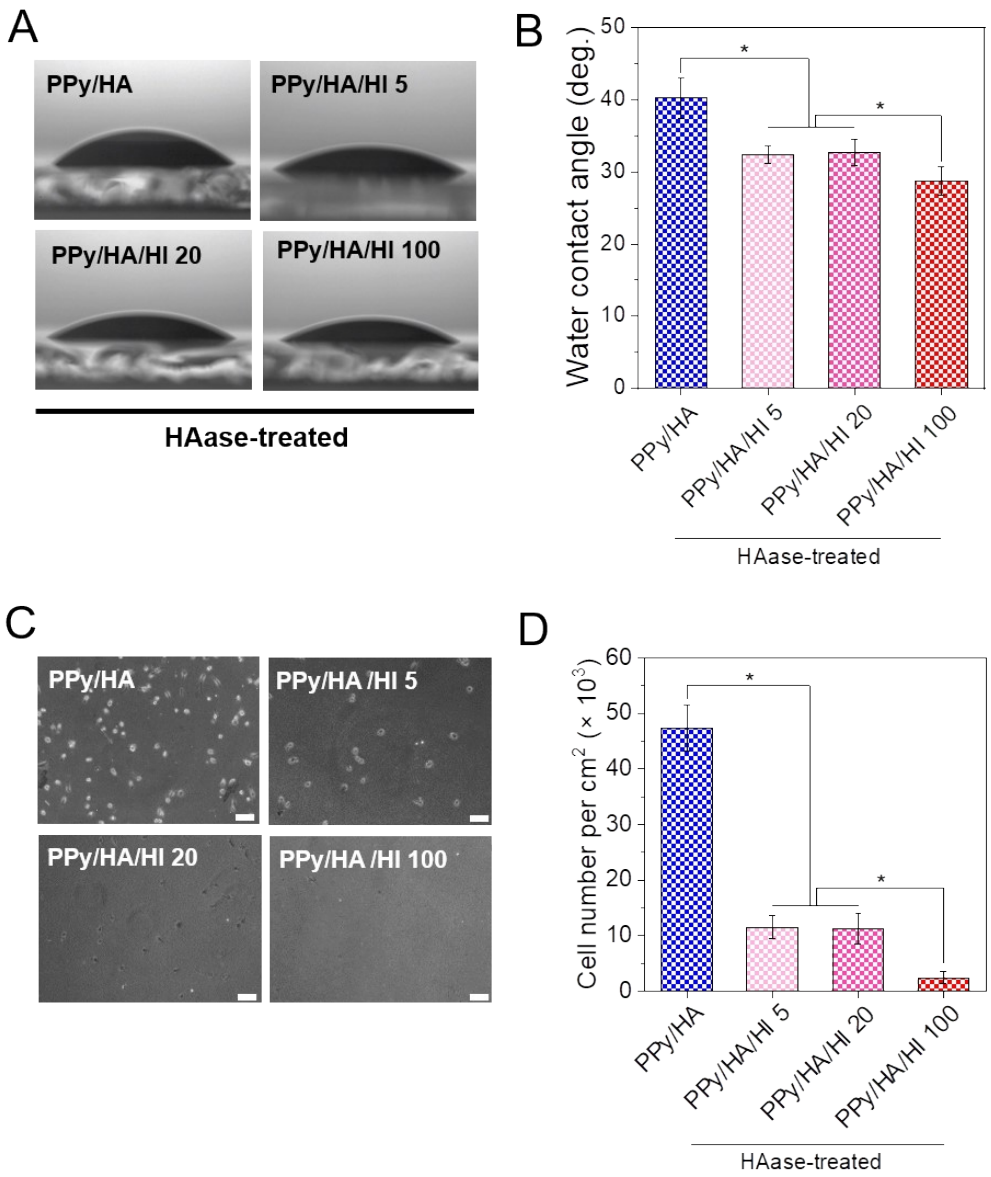

Figure S4. Characterization of PPy/HA/HI electrodes incorporated with various concentrations of hyaluronidase inhibitor (HI). (A) Photographs and (B) water contact angles (WCAs) of PPy/HA/HI after hyaluronidase (HAase) treatment. (C) Optical micrographs of the samples seeded with NIH-3T3 cells and cultured for 24 h. Scale bar = 100 μm. (D) Cell number per image of each electrode, 24 h after cell culture.

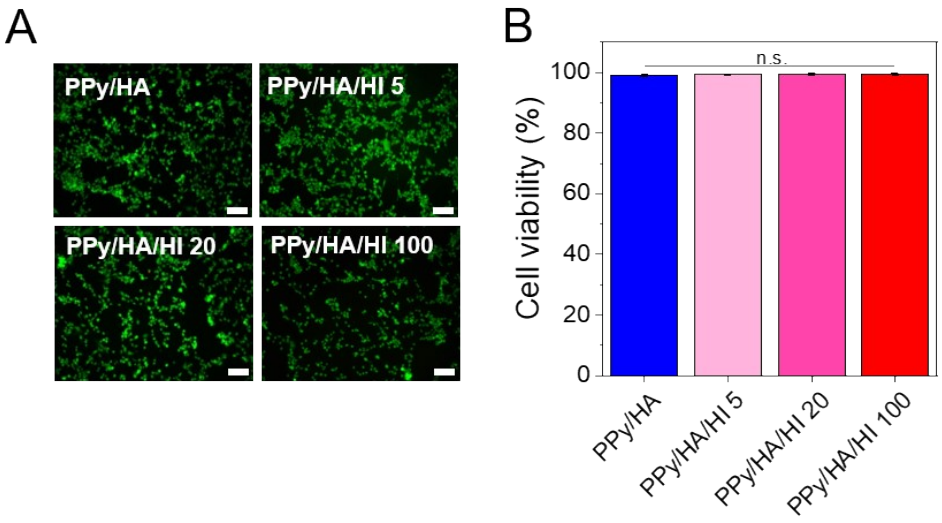

Figure S5. Cytocompatibility of various PPy/HA/HI electrodes prepared with different concentrations of glycyrrhizin. (A) LIVE/DEAD fluorescence images of NIH-3T3 cells incubated with the extracts obtained from various PPy/HA/HI electrodes. (B) Corresponding cell viability for each sample.

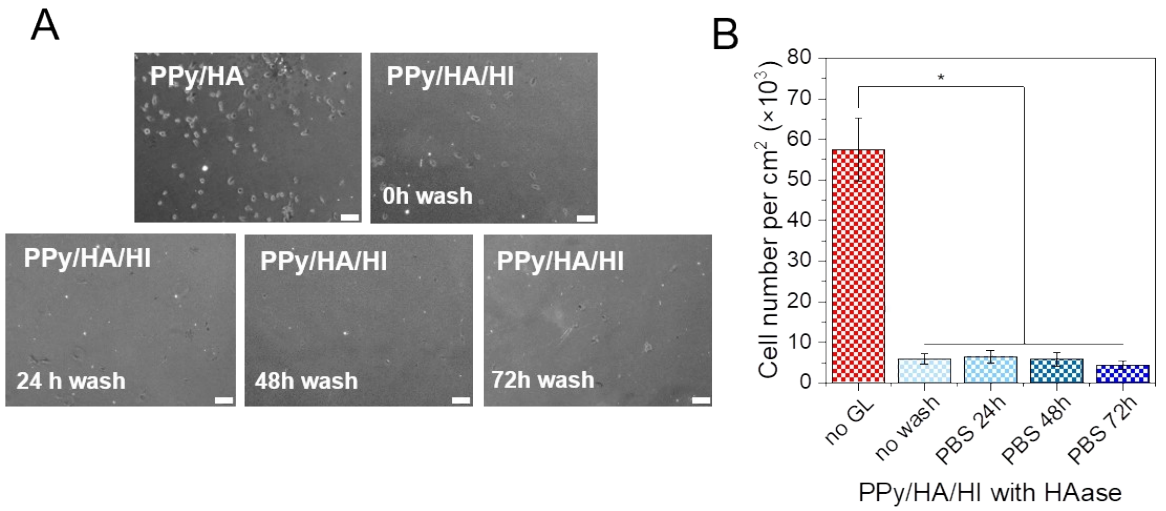

Figure S6. PPy/HA/HI electrodes' long-term resistance to cell adhesion. PPy/HA/HI electrodes were pre-incubated for washing for 0, 24, 48, or 72 h, respectively. (A) Optical images of NIH-3T3 cells on the PPy/HA/HI electrodes, pre-incubated with phosphate buffered saline (PBS) for different time periods. Scale bar = 100 μm. (B) Cell number per image of each electrode, 24 h after cell culture.

Table S1. Cumulative release amount of glycyrrhzin from various PPy/HA/HI electrodes (prepared with different concentrations of glycyrrhizin) in PBS solution with time.

	PPy/HA/HI 5	**PPy/HA/HI 20**	**PPy/HA/HI 100**
30min	0.783 (±0.63)	11.662 (±3.52)	88.801 (±7.38)
2h	1.55 (±1.24)	17.44 (±4.68)	133.36 (±18.85)
6h	1.91 (±1.42)	19.36 (±4.67)	151.24 (±28.65)
24h	4.46 (±2.237)	33.31 (±7.73)	158.34 (±32.58)
48h	4.46 (±2.237)	33.31 (±7.73)	158.56 (±32.59)
72h	4.46 (±2.237)	33.31 (±7.733)	158.74 (±32.58)
Tot. amount (μM)	4.46	33.31	**158.74**