

Electronic supplementary information (ESI)

Fabrication of a shape memory hydrogel based on imidazole-zinc ion coordination for potential cell-encapsulating tubular scaffold application

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Atomic absorption spectroscopy assay

A slice of swollen hydrogel was placed in a centrifuge tube containing Zn^{2+} solution with a concentration of 1 mmol/L at room temperature. The solutions before and after adsorption were quantified for the amount of zinc ions by HITACHI 180-80 atomic absorption spectroscope (AAS). The Zn^{2+} adsorption capacity of the gels was calculated according to the equation given below:

$$q = \frac{(C_0 - C_e)V}{m}$$

Where c_0 and c_e are the initial and final concentrations (mmol/L) of Zn^{2+} in the testing solution, V is the volume of the testing solution (L), and m is the weight of the wet gel (g).

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Table S1. Physical properties of hydrogels.

Hydrogel	EWC(%)	Tensile strength(KPa)	Elongation at break(%)	Young's Modulus(KPa)	R _f (%)	R _r (%)
PVI-AN-7	87.1±0.8	90±3	19.03±1.10	470±40	100%	100%
PVI-AN-5	80.3±0.4	109±8	21.73±2.66	500±30	100%	100%
PVI-AN-3	67.5±0.6	150±8	20.07±4.97	600±40	100%	100%

Data are given as average±SD from three or more independent measurements.

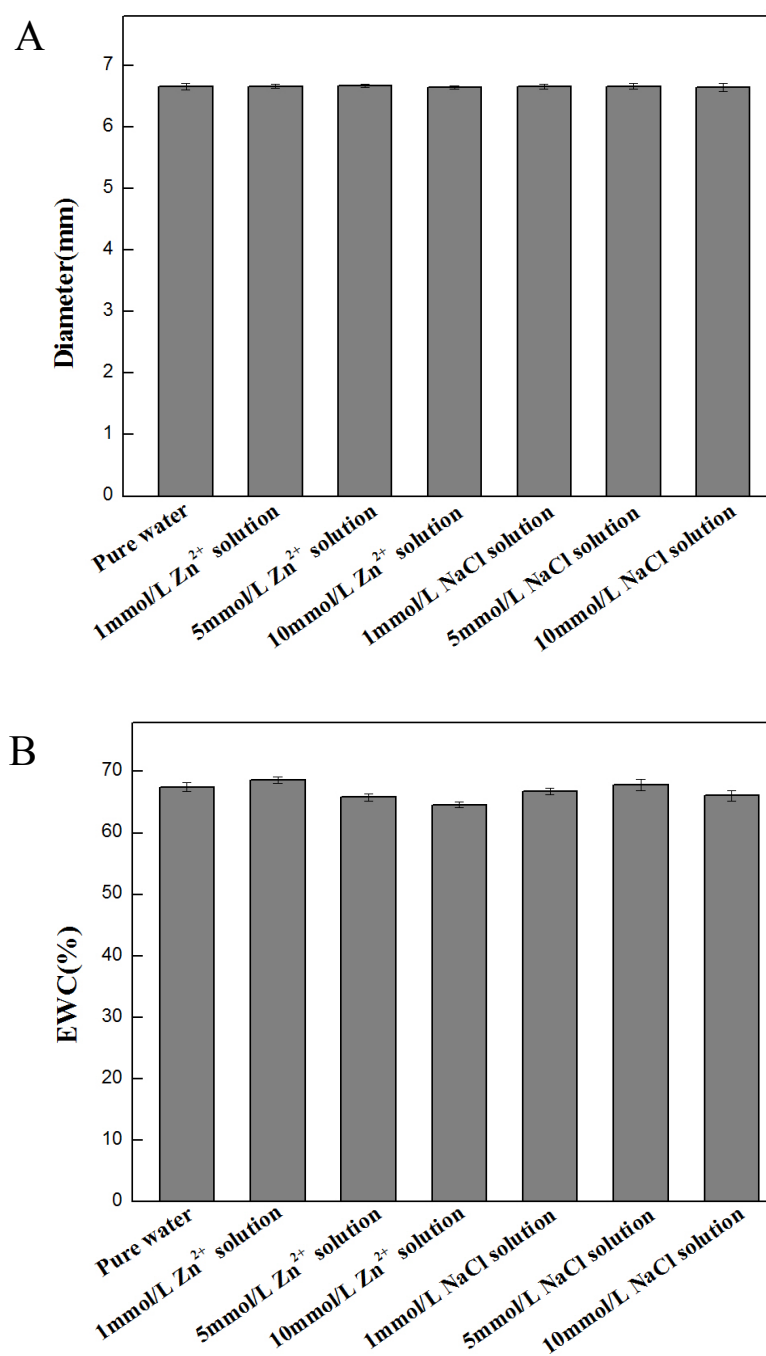


Fig. S1. Diameters (A) and EWCs (B) of PVI-AN hydrogel determined in different concentrations of zinc ion and NaCl solutions. NaCl solution serves as a control.

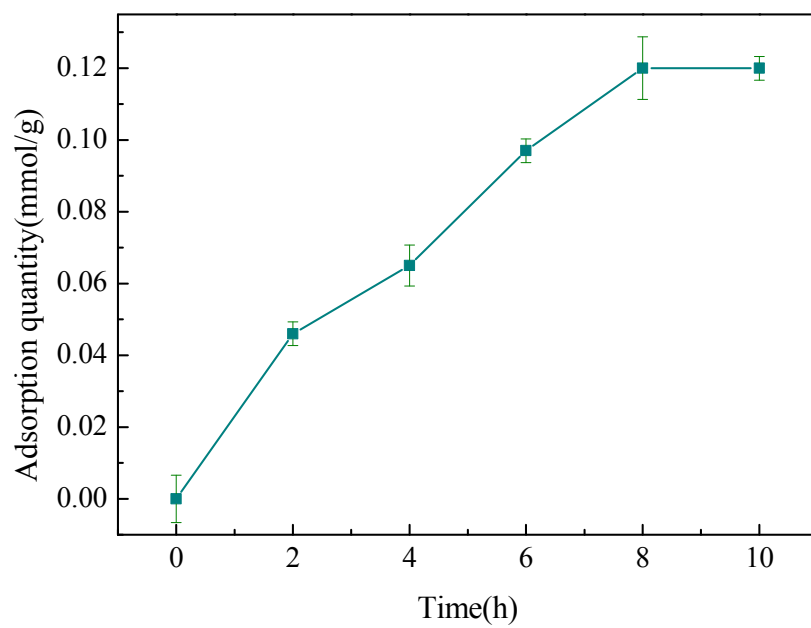


Fig. S2. Adsorption kinetics of zinc ions by hydrogel starting from 1 mmol/L ZnSO₄ solution.

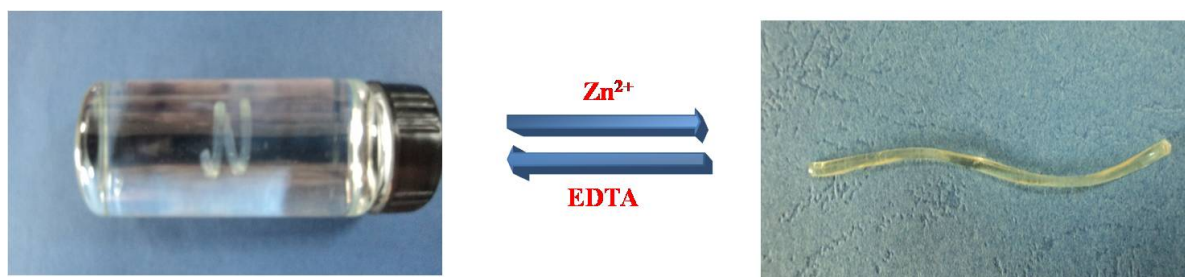


Fig. S3. Actual observation of shape memory effect of PVI-AN hydrogel. Original spiral shaped hydrogel was formed and stretched out to a strip shape, and then fixed in 10 mmol/l Zn^{2+} solution. The strip shape was transformed into original spiral shape after immersing in 50 mmol/L EDTA solution.

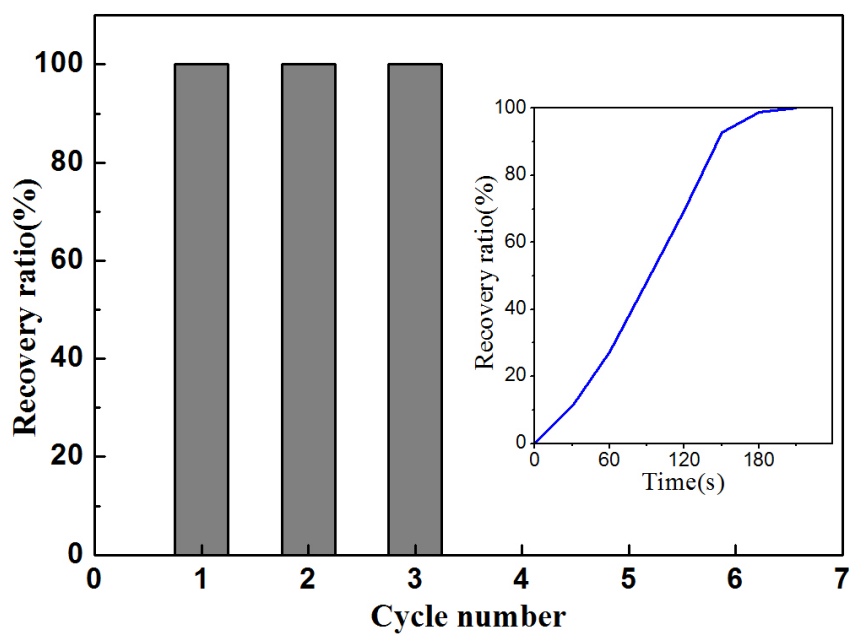


Fig. S4. Evaluation of shape memory cycle at 20°C under angle-controlled condition. Inset is the variation of recovery ratio as a function of time for one cycle.