Electronic Supplementary Material (ESI) for RSC Advances.

Enhanced Adsorption Behaviors of Co^{2+} on Robust Chitosan Hydrogel Microspheres Derived from Alkali Solution System: Kinetics and Isotherm Analysis

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Swelling and Degradation Behaviors in Different pH Conditions

The gravimetric method was employed to measure the swelling ratios of the chitosan hydrogel in different pH environment solutions (ionic strength was adjusted by adding 0.1 M NaCl solution). The swelling ratio (SR) was calculated as:

$$SR=\frac{Ws}{W_s - W_d}\times 100\% \qquad (1)$$

where W_s is the weight of the swollen hydrogel and W_d is the weight of the dried chitosan gel. The weight maintaining ratio (WMR) was determined by using the equation:

$$WMR=W_{d,pH}/\left(W_{s,\,initial}\times\frac{W_{d,pH=7}}{W_{s,pH=7}}\right)\times 100\% \qquad (2)$$

where $W_{d,pH=7}$ and $W_{s,pH=7}$ are the weight of the dried gel and the swollen hydrogel under the condition of pH=7 in water, respectively. $W_{s,initial}$ is the initial weight of chitosan hydrogel before incubating in different pH aqueous solution, $W_{d,pH}$ is the weight of dried chitosan gel after incubating in the corresponding pH aqueous solution for 48 h.

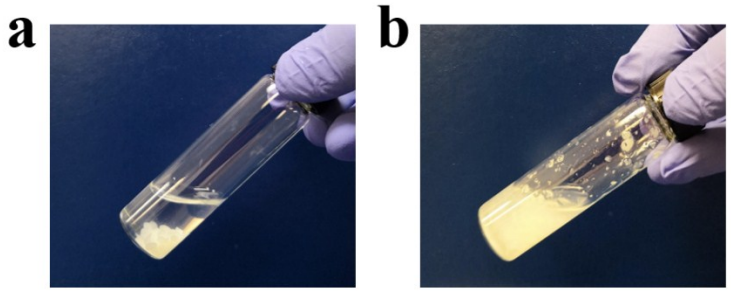

Figure S1. Photographs of the (**a**) chitosan and (**b**) A-chitosan hydrogel spheres after intense agitation in water. chitosan and A-chitosan indicated the chitosan pre-gel solutions derived from the alkaline and acetic acid solutions, respectively.

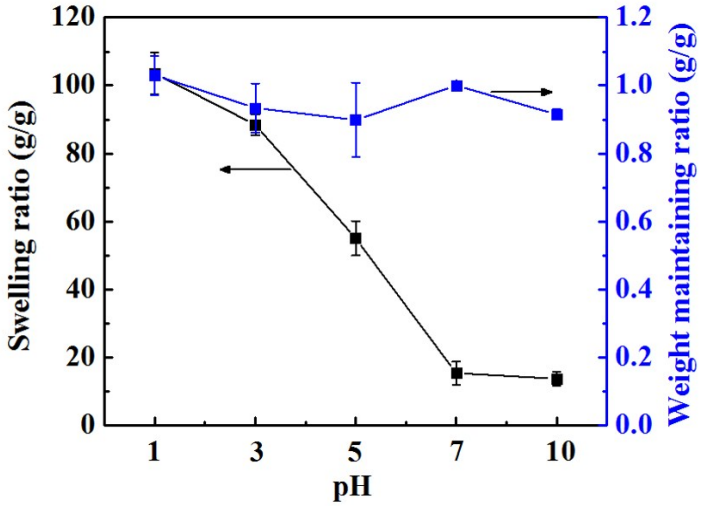

Figure S2. Swelling ratios and Weight maintaining ratios for chitosan hydrogel upon the 24-h incubation time in different pH solutions.

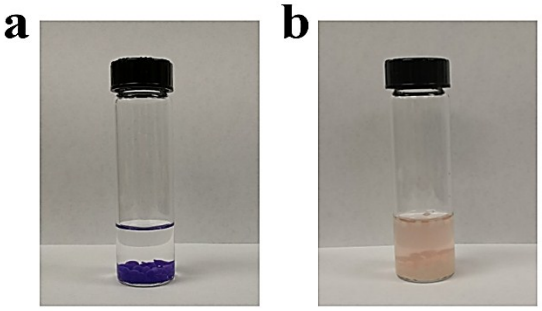

Figure S3. (**a**) Photographs of the chitosan hydrogel spheres after incubation in Co^{2+} alcohol solution for 24 h. (**b**) Desorption behavior for Co^{2+} loaded chitosan spheres in 0.1M EDTA aqueous solution.