Supplementary data

Facile synthesis of chitosan/polyacrylamide hydrogel for the efficient adsorption of bovine serum albumin from water

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Protein (BSA) calibration chart

A calibration curve is a graphical representation of the relationship between the concentration of a substance and a measurable property, such as absorbance, fluorescence intensity, or peak area in chromatography. It is used to determine the concentration of an unknown sample by comparing its measured property to the values on the calibration curve. For protein calibration curve measurement, various protein concentrations were prepared, and the absorbance readings were taken using a spectrophotometer at a wavelength of 729 nm. Fig. S1 depicts the protein calibration curve at a wavelength of 729 nm.

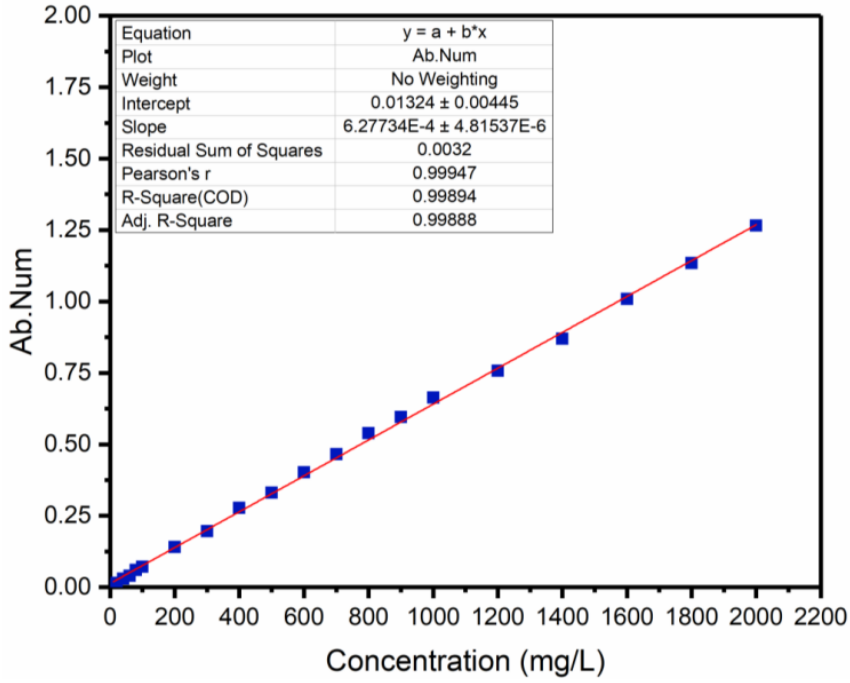

Fig. S1. Protein calibration diagram.

The results of the adsorption kinetics test

Fig. S2 presents the results of batch adsorption experiments on semi-interpenetrating network hydrogel adsorbents of chitosan/polyacrylamide. A 20 ml solution of 2000 mg/L protein at pH 7, with an adsorbent dosage of 25 mg, was examined at room temperature.

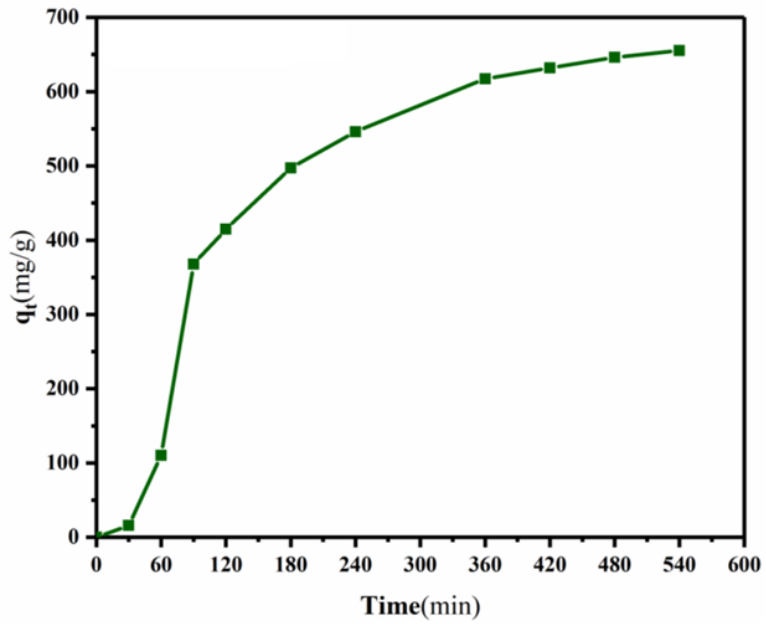

Fig. S2. Absorption kinetics for chitosan/PAM hydrogel

Results of nonlinear and linear pseudo-first order kinetic model

Figs. S3 and 4 show the nonlinear and linear forms of the pseudo-first-order kinetic model for the CHITOSAN/PAM hydrogel, respectively**.** By fitting the nonlinear first-order curve for the hydrogel, it is determined that the data fit well in the nonlinear case, and the fitting curve shows a good R2= 0.953. For the linear case, it also fits well with R^2= 0.968, and this kinetic model is a good interpreter for the adsorbent in question.

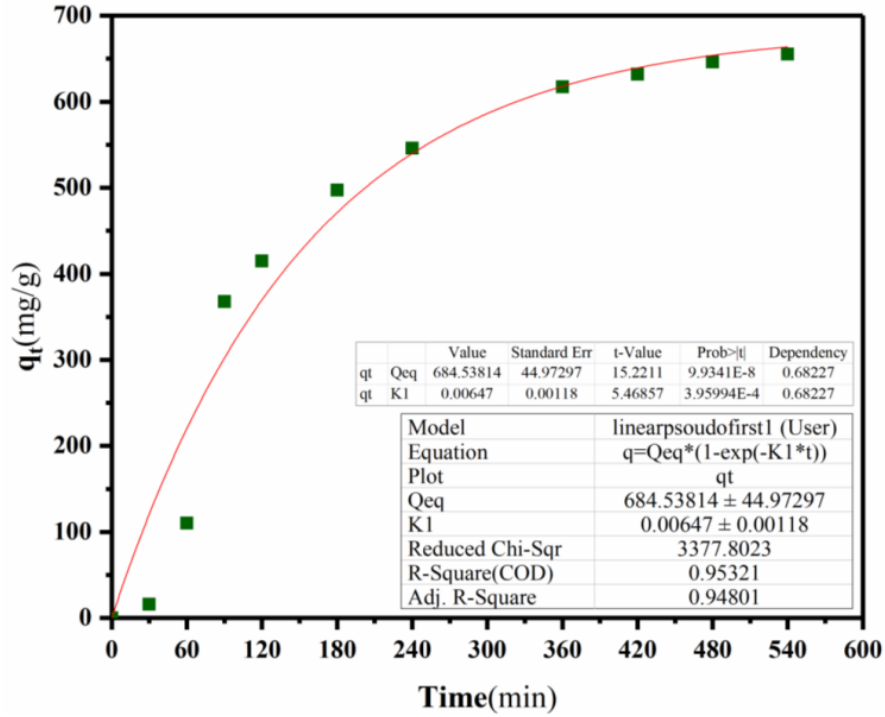

Fig. S3. Nonlinear psoudo-first-order kinetics for Chitosan/PAM hydrogel.

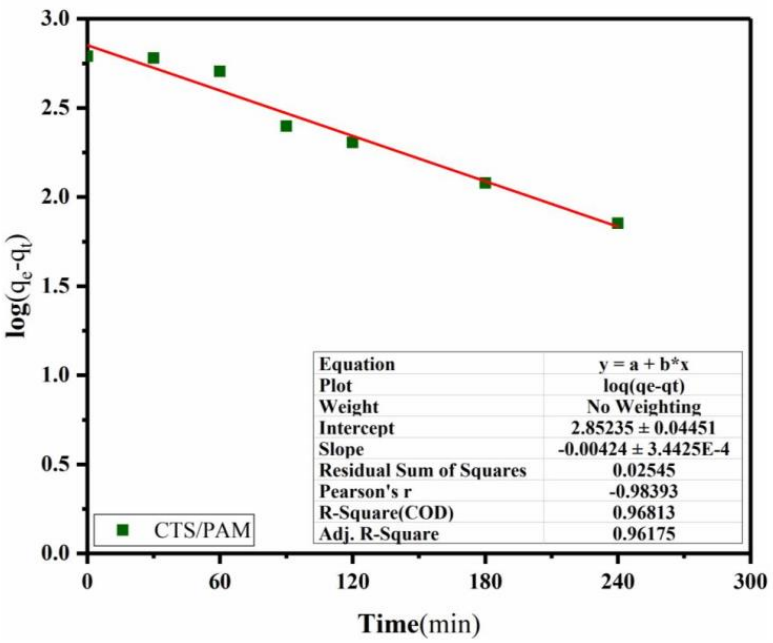

Fig. S4. Linear pseudo-first-order kinetics for chitosan/PAM hydrogel.

Results of nonlinear and linear pseudo-quadratic kinetic models

The results of fitting the nonlinear and linear pseudo-second-order kinetic model curves for the chitosan/PAM hydrogel are shown in Figs. S5 and 6, respectively**.** The results show that in the nonlinear case, the data fit was obtained with R^2= 0.942, which indicates that it is a good model for this adsorbent. Also, in the linear case, which can be seen in Fig. S5, the results of the fitting show the best possible case and are a good interpreter for the CHITOSAN/PAM hydrogel with R^2= 0.999.

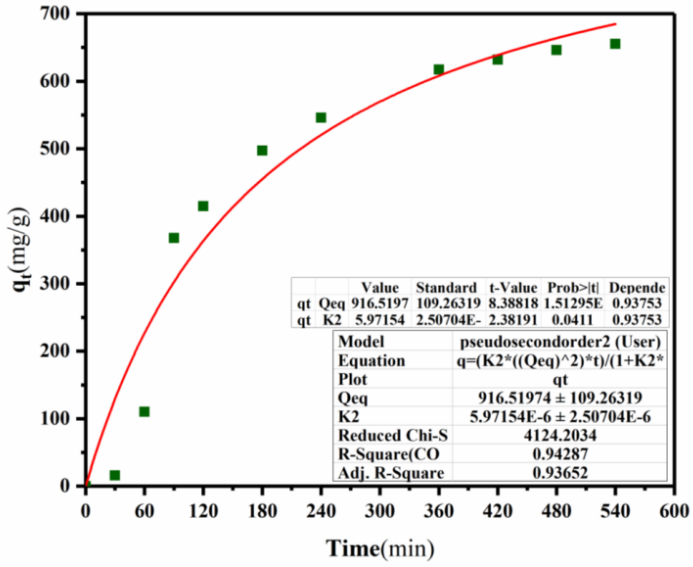

Fig. S5. pseudo second-order non-linear kinetic model for chitosan/PAM hydrogel.

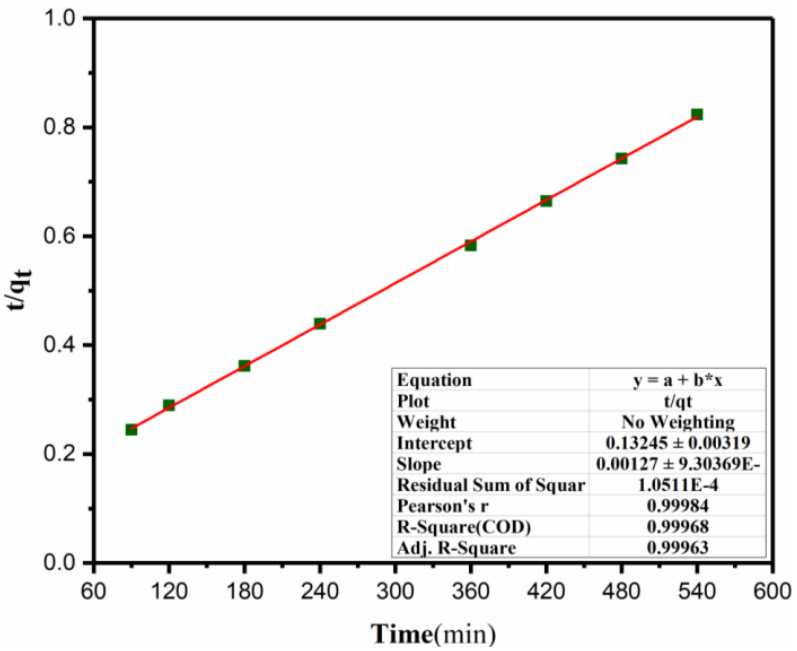

Fig. S6. pseudo second-order linear kinetic model for chitosan/PAM hydrogel.

Results of initial concentration and protein adsorption isotherm

Table S1. shows the data obtained from protein adsorption at different concentrations and at three temperatures of 25, 35, and 45 °C at pH = 7. The results of the experiments show that the adsorption capacity by the chitosan/PAM hydrogel increased with increasing temperature and protein concentration.

Table S1. The amount of protein adsorbed at different concentrations and temperatures for CHITOSAN/PAM adsorbent.

Amount of adsorbed protein, mg/g			Equilibrium concentration, mg/L			Initial concentration, mg/L
45 °C	35 °C	25 °C	45 °C	35 °C	25 °C	
674.8	658.133	650.13	313	354.67	374.67	2000
974.8	960.13	949.47	653	599.67	626.33	3000
1093.46	1074.8	1063.47	766.33	813	541.33	3500
1226.8	1209.46	1198.13	933	976.33	1004.67	4000