

## Smart Hydrogel Based on Derivatives of Natural $\alpha$ -Amino Acids

### for Efficient Removal of Metal Ions from Wastewater

#### Sorption isotherm

The Freundlich model features a heterogeneous system. In this model  $1/n$  is a heterogeneity factor. This model describes also a reversible adsorption. It is not limited to the formation of the monolayer. The Freundlich isotherm is given in linearized form as:

$$\ln q_e = \frac{1}{n} \ln C_e + \ln K_F$$

where  $K_F$  (mg/g)(L/mg) $^{1/n}$  and  $n$  (dimensionless) are constants depicting the adsorption process.

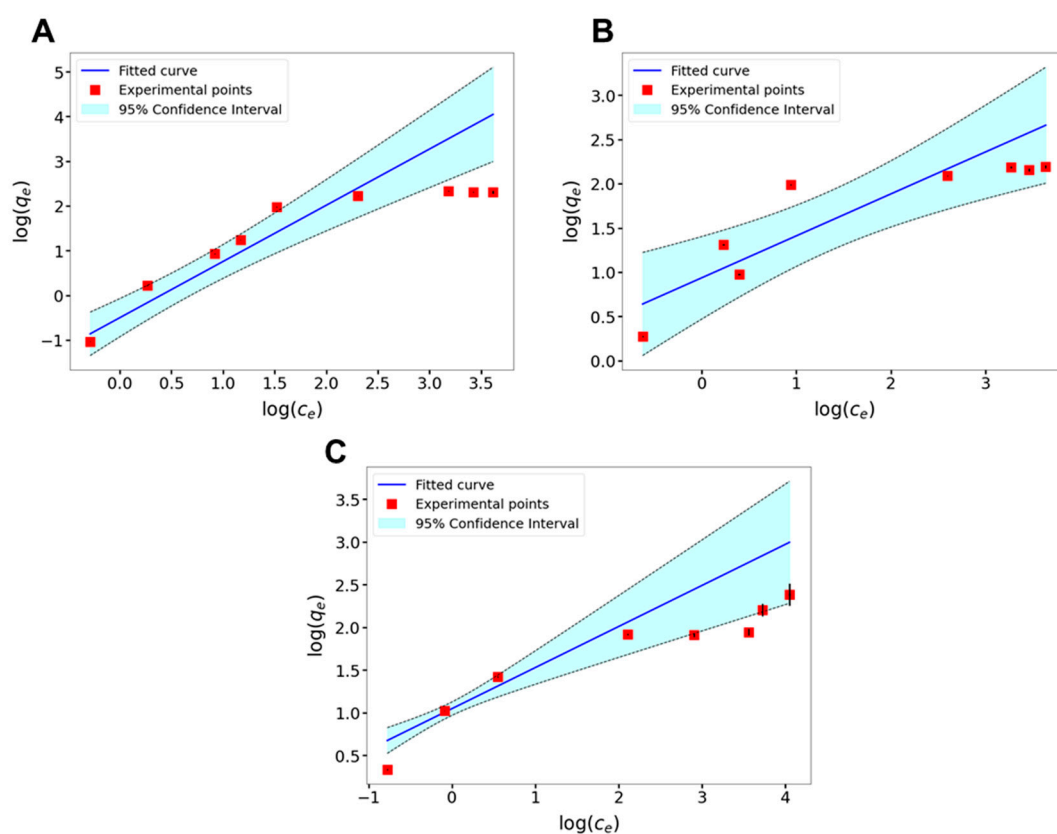


Figure S1. Fitting experimental data obtained from sorption experiments to Freundlich model for: Ag(I) (A), Pb(II) (B) and Cu(II) (C) ions. Error bars represent standard uncertainties of both correlated variables.

## Sorption kinetics

The Weber–Morris model assumes that, in many adsorption scenarios, the solute uptake is nearly proportional to  $t^{1/2}$  rather than to the contact time  $t$ :

$$q_t = K_{int}t^{1/2}$$

In this model,  $K_{int}$  represents the intraparticle diffusion rate constant. When intraparticle diffusion is the rate-limiting step, a plot of  $q_t$  versus  $t^{1/2}$  should yield a straight line with a slope of  $K_{int}$ . The straight line should pass through the origin if intraparticle diffusion is the sole mechanism for adsorption.

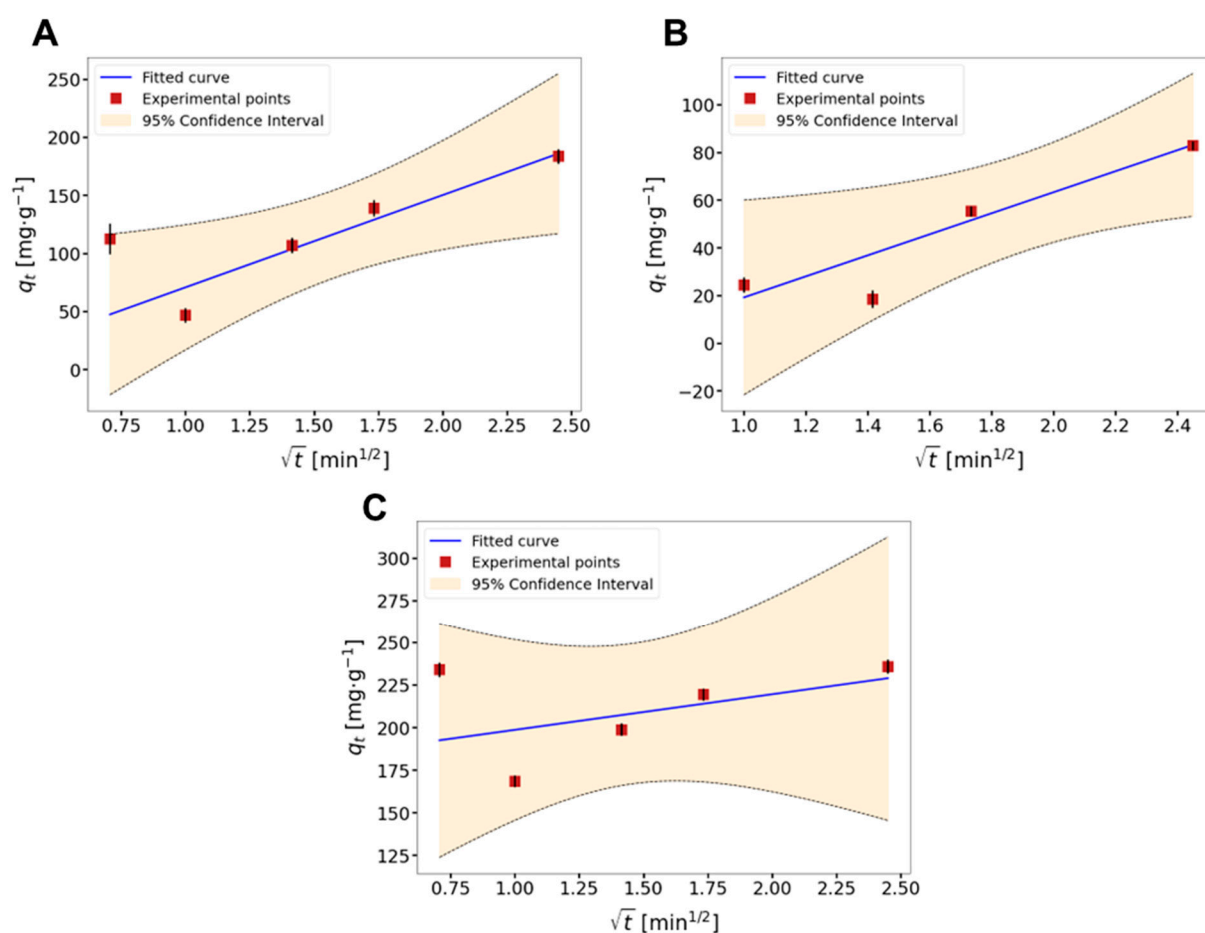


Figure S2. Fitting experimental data obtained from sorption kinetic experiments to Weber–Morris model: Ag(I) (A), Pb(II) (B) and Cu(II) (C) ions. Error bars represent standard uncertainties of both correlated variables.

## X-ray photoelectron spectroscopy (XPS) investigation

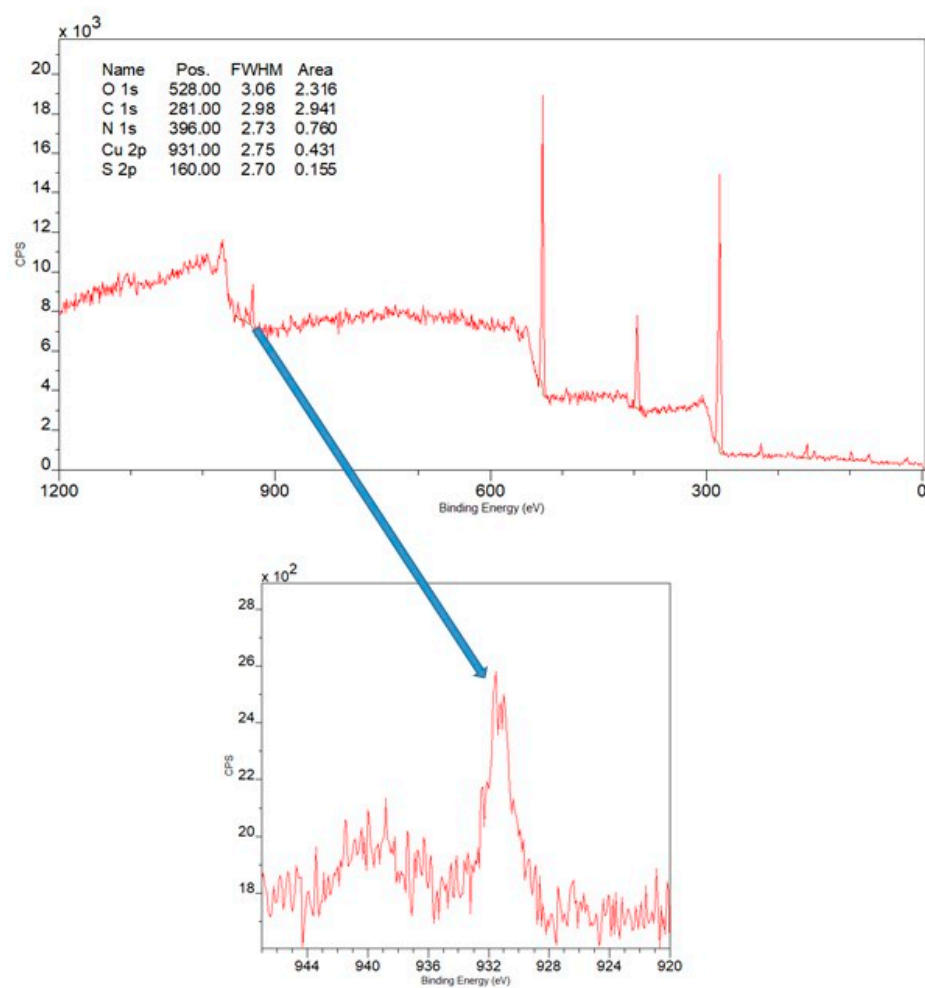


Figure S3. XPS spectra for AcOrn-BISS hydrogel samples after the sorption of Cu(II) ions

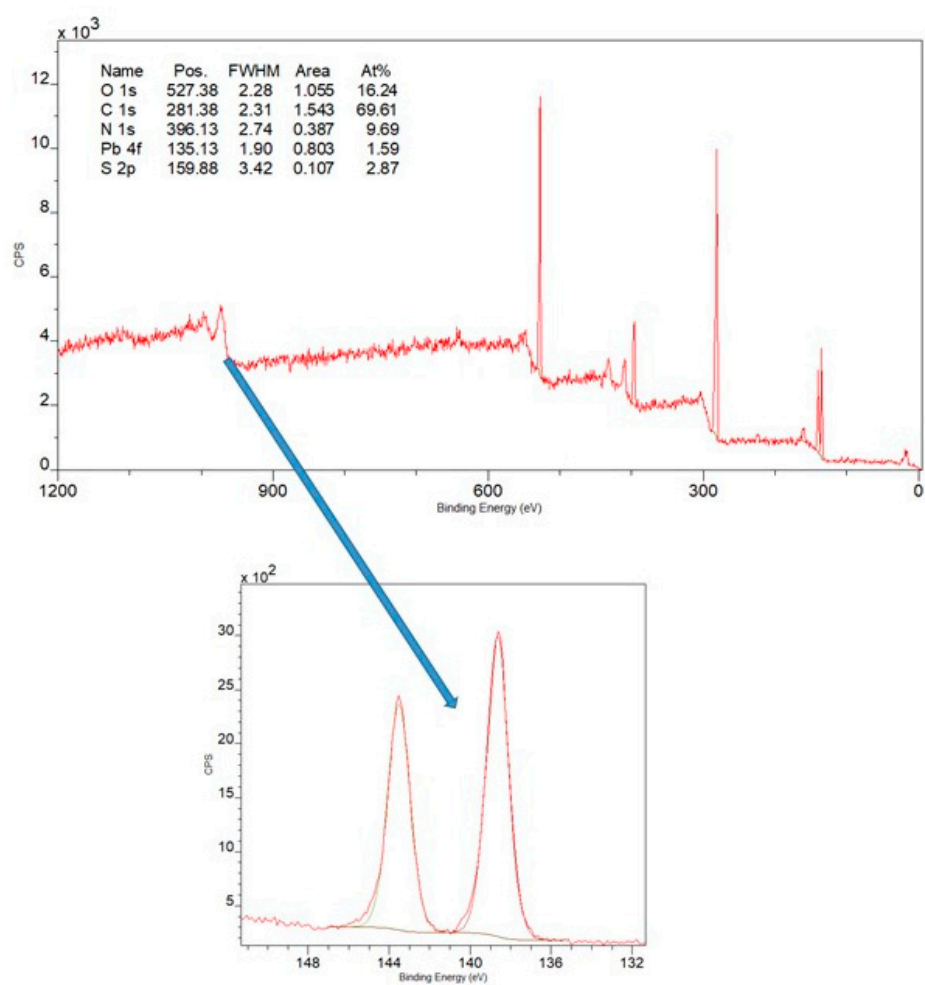


Figure S4. XPS spectra for AcOrn-BISS hydrogel samples after the sorption of Pb(II) ions.