Supplementary information:

Corresponding to section 2.2 in the paper-Preparation of coagulant and coagulant aid

FTIR spectra

Ep powder was mixed with KBr powder, ground and pressed to explore specific functional groups in Ep by the FTIR measurement. The instrument was Nicolet IS 10 spectrometer and the frequency range of 4000-500 cm^{-1}.

XPS spectra

XPS spectra of Ep powder was detected by Thermo ESCALAB 250XI spectrometer. 284.6eV and Gaussian-Lorentzian fitting were used to make a correction of surface charging effects and convert peak areas to total intensities in this paper.

NMR spectra

Ep powder was dissolved in D_2O, and ^{1}H and ^{13}C spectra were measured by Ascend 400 NMR spectrometer. Chemical shifts are given in values of δ (ppm), referenced to residual solvent signals.

SEM and EDS characteristics

SEM and EDS images

SEM and EDS images were obtained from a high vacuum and resolution microscope HITACHI-SU8010 in this study. Ep powder should be distributed uniformly and sprayed a layer of gold for several seconds before measured.

XRD measurement

The crystal phases of AgNPs in flocs were recorded using powder XRD (Bruker D8 Advance X-ray diffractometer) with Cu Kα (λ = 0.15418 nm), and the scanning rate was 8°/min.

***Corresponding to section 3.1 in the paper*-Ep Characterization and structure analysis**

As can be seen from Fig. S1, a mass of S and N elements could be found in EDS mapping of Ep powder, which indicated the existence of sulfate and amino group.

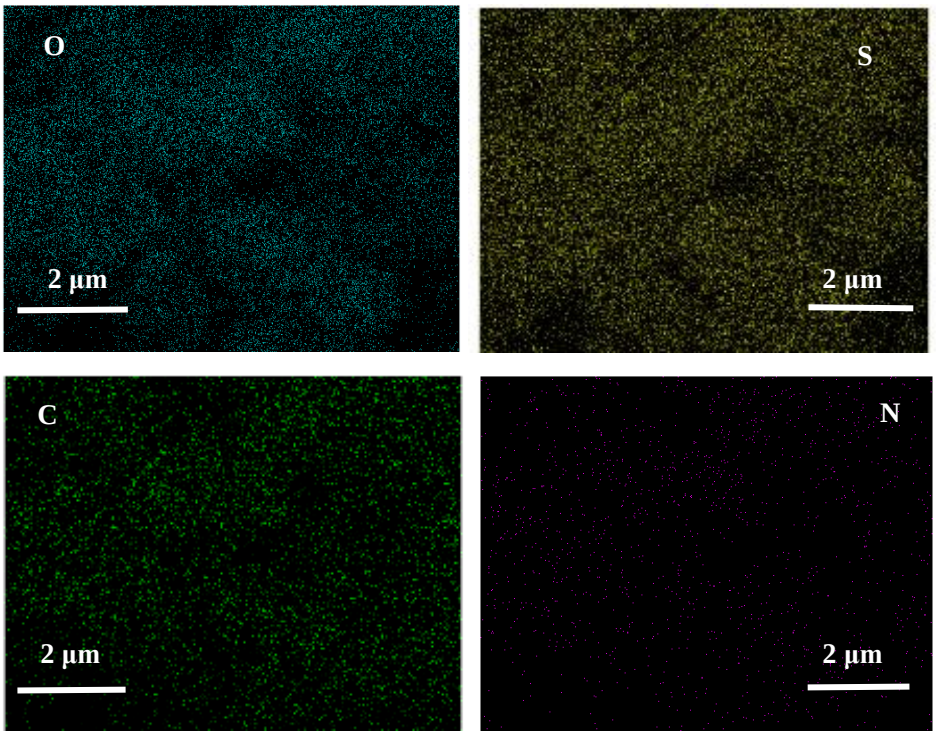

Fig. S1 EDS images of Ep

***Corresponding to section 3.1 in the paper*-Ep Characterization and structure analysis**

Infrared adsorption bands of Ep powder were list in Table S1.

Table S1 Infrared adsorption bands of Ep

Wavenumber/cm^{-1}	Vibration
3347	OH stretching
2937	C-H stretching
1608	C=O stretching
1420	C-H change angle
1146	S=O stretching of sulfate group
848	C-O-S stretching

***Corresponding to section 3.1 in the paper*-Ep Characterization and structure analysis**

^{1}H NMR spectra data of Ep powder were list in Table S2.

Table S2 ^{1}H NMR spectra data of Ep

δ /ppm	Group
1.21	-CH_3 of rha
3.22, 3,36, 3,52, 3,76, 3.86	other proton signals except anomeric protons
4.41	1→4 xyl anomeric proton
4.70	1→4 glcUA anomeric proton
5.30	1→4 rha anomeric proton

***Corresponding to section 3.1 in the paper*-Ep Characterization and structure analysis**

^{13}C NMR spectra data of Ep powder were list in Table S3.

Table S3 ^{13}C NMR spectra data of Ep

δ /ppm	Group
14.36	-CH_3 of rha
100.20 (region)	1→4 glcUA anomeric carbon, 1→4 rha anomeric carbon
171.59	-COOH of glcUA