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CORRECTION

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Correction: Super-adsorbent hydrogel for removal of methylene blue dye from aqueous solution

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Correction for 'Super-adsorbent hydrogel for removal of methylene blue dye from aqueous solution' by Xiao-Sai Hu *et al.*, *J. Mater. Chem. A*, 2018, **6**, 17612–17624, https://doi.org/10.1039/C8TA04722G.

As outlined in the Comment article, **https://doi.org/10.1039/C9TA11420C**, several errors were identified in the published article. The authors apologize for the mistakes and outline the corrections below:

1. Adsorption kinetics

Firstly, the issues on the units of rate constants (k_1, k_2 and k_{id}), and the values of q_e and k_2 for the pseudo-second-order model can be found corrected in Table 1.

Table 1 Kinetic parameters for MB adsorption onto the NC gel adsorbent

		Model								
		Pseudo-first-order			Pseudo-second-order			Intra-particle diffusion		
Adsorbent	Dye	q_e (mg g^{-1})	k_1 (h^{-1})	R^2	q_e (mg g^{-1})	$k_2 \times 10^{-5}$ (g mg^{-1} h^{-1})	R^2	C (mg g^{-1})	k_{id} (mg g^{-1} h$^{-1/2}$)	R^2
NC gel	MB	1364	0.03507	0.964	1118	2.087	0.993	82.7676	68.0952	0.949

The issues with the units of the K_L and K_F values are corrected below in Table 3.

Table 2 aimed to compare the adsorption capacity at equilibrium of different adsorbents towards dyes. However, the original Table 2 mistakenly contained the calculated maximum adsorption capacity based on the Langmuir model instead of the experimental equilibrium adsorption capacity. This has been corrected in Table 2 below:

Table 2 Comparison of the adsorption capacity at equilibrium (q_e) of the PAA-based hydrogel adsorbent and other adsorbents for the removal of dyes

Adsorbent	Dye	Adsorption capacity (mg g^{-1})	Reference
Poly(AAc-*co*-AAm)	Crystal violet	4	12
	Basic magenta	11	
Poly(AAc)	Basic red 29	986	13
	Methylene blue	220	
BPCMC-*g*-poly (NaAc-*co*-AM)	Methylene blue	<333	2
Poly(AA-*co*-AMPS)/montmorillonite	Methylene blue	215	15
Poly (AA-*co*-NaAc-*co*-AM)	Azure-I	1169	14
β-CD/PAA/GO nanocomposite	Methylene blue	247	27
PAA/CNS	Methylene blue	2100	This work
Poly(APTMACl)/γ-Fe_2O_3	Acid orange 52	1428	21

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Table 2 (*Contd.*)

Adsorbent	Dye	Adsorption capacity (mg g^{-1})	Reference
Cellulose/chitosan hydrogel	Congo red	38	22
Poly(DEAEMA)/starch	Direct red 81	<120	19
Cellulose nanocrystal-alginate	Methylene blue	72	20
Activated carbon	Methylene blue	581	9
Sodium alginate/PAA/TiO_2	Methyl violet	728	23
Graphene oxide/calcium alginate	Methylene blue	<350	44
MgAl-layered double hydroxides	Methylene blue	121	43
Graphene–carbon nanotube	Methylene blue	68	10
Graphene oxide/chitosan sponge	Methylene blue	<300	24
$Fe_3C/Fe_3O_4/C$ nanosheets	Methylene blue	982	25
Exfoliated montmorillonite nanosheets (MMTNS) and chitosan (CS)	Methylene blue	<530	26

Table 3 Isotherm parameters for MB adsorption onto the NC gel adsorbent

Adsorbent	Dye	Model	Parameter	298 K	308 K	318 K
NC gel	MB	Langmuir isotherm	q_{max} (mg g^{-1})	2455	1941	1504
			K_L (L mg^{-1})	0.0229	0.0257	0.0377
			R^2	0.9808	0.9883	0.9941
		Freundlich isotherm	n	1.84	2.04	2.30
			K_F (mg g^{-1})/(mg L^{-1})$^{1/n}$	127.1	130.1	143.6
			R^2	0.8955	0.8608	0.8045

After correction, by comparing the experimental equilibrium data, it was found that the NC gel showed a good adsorption capacity for MB. Thus, it can still be claimed that the NC gel is a super-adsorbent.

The statement (on page 17618) "It can be concluded that the pseudo-second-order kinetic mechanism can better describe the adsorption behavior of the NC gel for MB, indicating that the adsorption rate-controlling step was ascribed to the chemical process" should be changed into "Obviously, the pseudo-second-order model is more suitable for describing the adsorption behavior of the NC gel for MB removal."

2. Adsorption isotherms

The graph with the q_e and the correct C_e values has been provided in Fig. 8. The corresponding q_{max} value obtained by the Langmuir plot has been provided in Fig. 9a and Table 3.

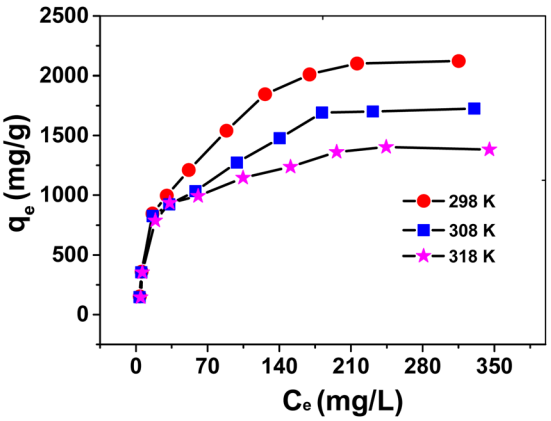

Fig. 8 Equilibrium isotherms of MB adsorption onto the NC gel adsorbent at different temperatures: pH = 7, t = 7 days, 40 mg L^{-1} adsorbent.

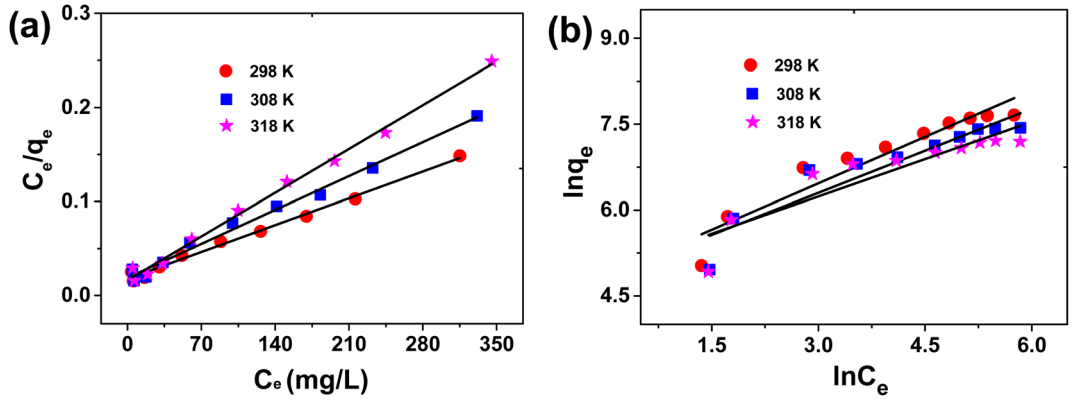

Fig. 9 Fitting curves of the Langmuir isotherm model (a) and the Freundlich isotherm model (b) of MB adsorption onto the NC gel adsorbent at different temperatures and different initial MB concentrations: pH = 7, t = 7 days, 40 mg L^{-1} adsorbent.

According to the relevant parameters in Fig. 9 and Table 3, it was clear that the Langmuir model can better match the isotherm data of MB adsorption by the NC gel because the R^2 values of the Langmuir model were much higher than those of the Freundlich model at three different temperatures. Based on the Langmuir model, the theoretical maximum adsorption capacity (q_{max}) of MB by the NC gel was calculated to be 2455 mg g^{-1} at 298 K, 1941 mg g^{-1} at 308 K and 1504 mg g^{-1} at 318 K, which are close to the experimental data (2120 mg g^{-1}, 1720 mg g^{-1} and 1380 mg g^{-1}). These showed that the Langmuir model can be applied for the adsorption of MB onto the NC gel.

3. Difference between pH_{pzc} and pH_{IEP}

In the "Characterization" section, the authors mentioned "the point of zero charge (pH_{pzc}) of the swollen NC gel was obtained according to the zeta potentials". "point of zero charge (pH_{pzc})" should be corrected into "isoelectric point (pH_{IEP})" in the corrected manuscript.

pH_{pzc} is the pH at which the charge of the surface is zero. It is designated the point of zero charge.

pH_{IEP} is the pH at which zeta potential is zero, which can be measured by zeta potential.

When there is no presence of a characteristic adsorption ion, the values of pH_{pzc} and pH_{IEP} are the same.

4. Comment on the energy-dispersive spectroscopy (EDS) data

The EDS spectra in the original published work contains additional elements (Au and Pd), which are from the sputtered gold powder during the EDS test. In the correction, Au and Pd are removed from the EDS spectra.

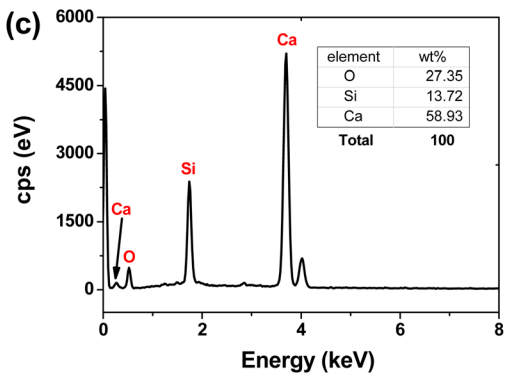

Fig. 4 (c) EDS spectra of the as-obtained Ca_3SiO_5.

5. Unclear information on the dried mass of adsorbent used in the study of adsorption

The unit of adsorbent dosage in the original published work was g. In the latest correction, the unit of adsorbent dosage should be changed into mg L^{-1}.

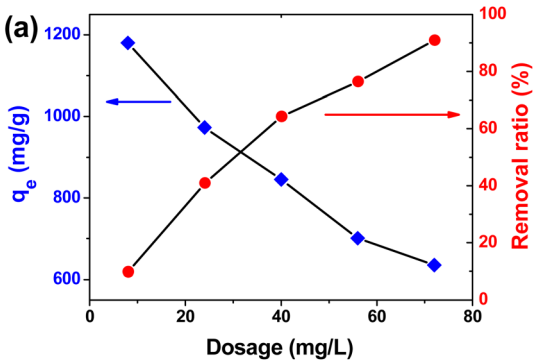

Fig. 6 (a) Effect of NC gel adsorbent dose on adsorption of MB at room temperature (298 K), pH = 7.0, $C_0 = 50$ mg L^{-1}, $t = 7$ days.

6. Discussion on the method determining the porosity of the adsorbent

Adobe Photoshop was employed to calculate the porosity of the freeze-dried swollen NC gel. The porosity was defined as the ratio of a pore's pixel value (A_1) relative to the total pixel value (A_0) of the SEM image, $R(\%) = A_1/A_0 \times 100\%$.

7. Other comments

In the section "Dye adsorption experiment" (on page 17614), the authors rewrite the paragraph as the following:

The removal ratio (R%) and the adsorption capacity at equilibrium (q_e, mg g^{-1}) and at time t (q_t, mg g^{-1}) for MB were evaluated using the following eqn (3)–(5):

$$R\% = \frac{C_0 - C_t}{C_0} \times 100\%, \tag{3}$$

$$q_t = \frac{(C_0 - C_t) \times V}{m}, \tag{4}$$

$$q_e = \frac{(C_0 - C_e) \times V}{m}, \tag{5}$$

where C_0 (mg L^{-1}), C_e (mg L^{-1}) and C_t (mg L^{-1}) are the dye concentration at the initial time, at equilibrium, and at time t, respectively. V (L) is the volume of dye solution and m (g) is the weight of dried adsorbent.

The adsorbent dosage (8, 24, 40, 56 and 72 mg L^{-1}) on the effect of the NC gel towards MB was firstly studied. Different adsorbent doses were added into 50 mL of MB solution (50 mg L^{-1}) at room temperature (298 K) and at a solution pH of 7.0. The final MB concentration of the solution was determined after a contact time of 7 days.

To investigate the effect of solution pH (1–13) on the removal of MB, NC gel (40 mg L^{-1}) was added into 50 mL of MB solution (50 mg L^{-1}) at room temperature (298 K), in which the initial pH of the solution was adjusted by using HCl or NaOH. The final MB concentration of the solution was analyzed after a contact time of 7 days.

Adsorption kinetics experiments were carried out within different contact times by adding NC gel (40 mg L^{-1}) into 50 mL of MB solution (50 mg L^{-1}) at the optimal solution pH of 7.0 at room temperature (298 K). After designated time periods, the final MB concentration of the solution was determined.

Both adsorption isotherm and thermodynamic experiments were conducted by adding NC gel (40 mg L^{-1}) into 50 mL of MB solution with different initial MB concentrations (10, 20, 50, 70, 100, 150, 200, 250, 300 and 400 mg L^{-1}) at different temperatures (298 K, 308 K and 318 K) with a solution pH of 7.0. The final MB concentration of the solution was determined after a contact time of 7 days.

To investigate the reusability of the adsorbents, 40 mg L^{-1} adsorbent was added to 50 mL MB solution (50 mg L^{-1}) to achieve saturated adsorption at room temperature (298 K) and pH = 7.0. The MB adsorbed onto the NC gel adsorbent was then eluted with adequate 0.1 M HCl solution and further regenerated in deionized water. The recycled adsorbent was used for the next adsorption cycle.

In the two sentences beginning "This polymerization provided..." (on page 17614 and 17615) that refer to Fig. 1(f), "hydrogen bonds" should be changed into "chelation interactions".

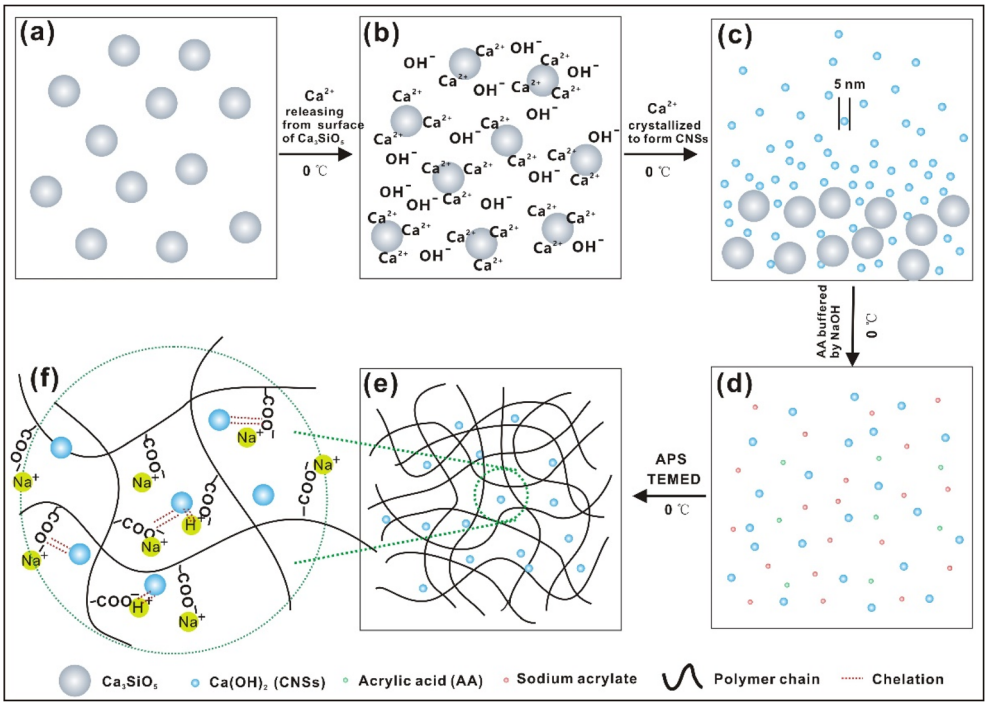

Fig. 1 Schematic diagram of the NC gel adsorbent. (a) Tricalcium silicate (Ca_3SiO_5) was dispersed in water at 0 °C and maintained at 0 °C for 3 days; (b) Ca^{2+} released from the surface of the Ca_3SiO_5 powder; (c) Ca^{2+} crystallized to form calcium hydroxide ($Ca(OH)_2$) nano-spherulites (CNSs) with a diameter of around 5 nm; (d) acrylic acid, sodium acrylate and CNSs were mixed uniformly; (e) and (f) formation of the super-adsorbent NC gel using CNSs as cross-linkers.

The Royal Society of Chemistry apologises for these errors and any consequent inconvenience to authors and readers.