SUPPLEMENTARY INFORMATION

Clay-Bionanocomposites with Sacran Megamolecules for the Selective Uptake of Neodymium

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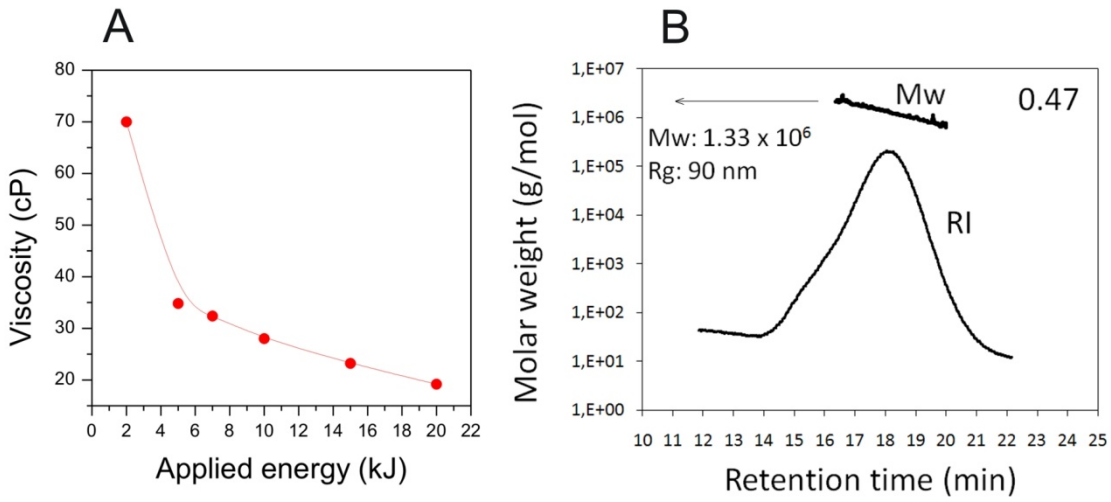

Fig. S1 (A) Decrease in viscosity of a 0.3%(w/v) sacran solution due to application of increasing energy with an ultrasound tip. (B) Absolute weight-average molecular weight (Mw) of a representative ultrasonicated sacran sample which was distributed by size exclusion chromatography equipped with multi-angle static light scattering system. The curve labeled by RI is the differential refractive indices. In this example, the Mw value of the 0.3%(w/v) sacran solution after ultrasonic irradiation (10 kJ) was decreased to 1.33 x 10^6 g/mol. The "radius of gyration" (Rg) of this sample was 90 nm. The number shown upper-right is the slope of a log-log plot of Rg as a function of Mw, called a Conformation Plot. The slope gives a good estimate of the sacran shape. Inclination of conformation plots (Mw vs Rg) was 0.47 in this sample, indicating the treated sacran chains adopt the intermediate conformation between random-coil (0.60) and spherical (0.33).

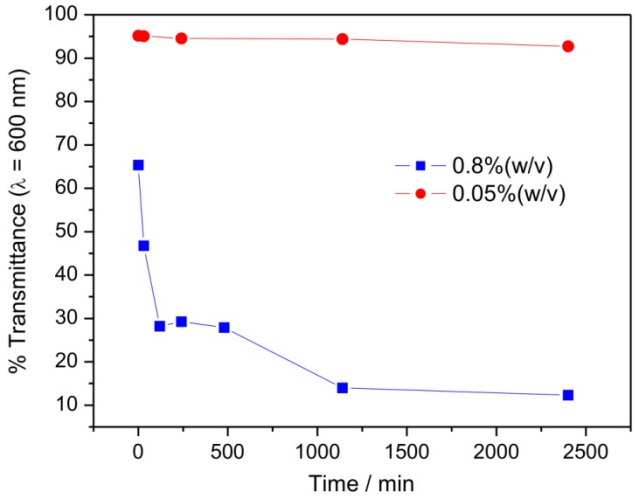

Fig. S2 Transmittance measured at 600 nm as a function of time of 0.05 and 0.8%(w/v) sacran solutions prepared by ultrasonication (10 kJ of applied energy).

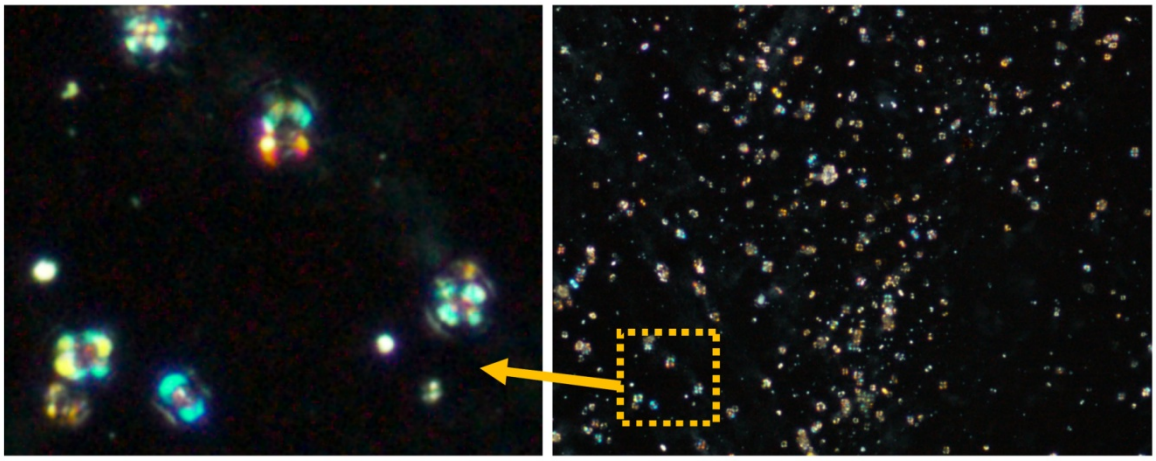

Fig. S3 Image obtained with a polarizing microscope (objective lens 10x) of a concentrated sacran sample (0.8%(w/v)) prepared by ultrasonication, showing the presence of crystalline domains characteristic of liquid crystals. The isotropic medium appears in black color.

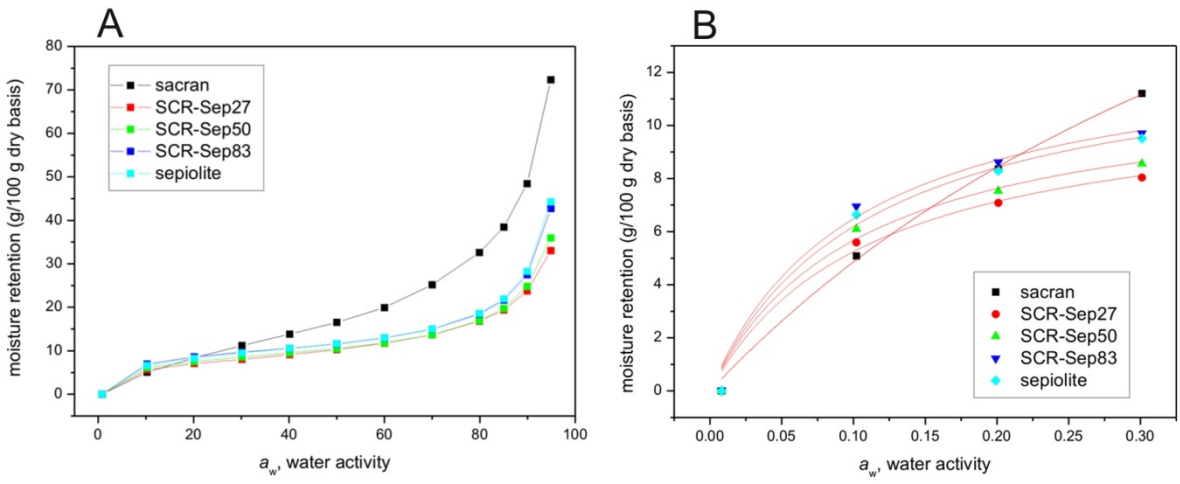

Fig. S4 (A) Moisture sorption isotherms of three sacran-sepiolite bionanocomposites with different clay content, together with the isotherms of the individual components. (B) Fitting of the data from the first part of the isotherms to the Langmuir model.

Table S1. Fitting of data at low water activities (up to 30%RH) to the Langmuir model (Eq. S1).

	X_m (g/100 g)	b	Chi^2/DoF	R^2
Film sacran	31.61903	1.81525	0.07851	0.9966
Scr-Sep27	11.14782	8.88133	0.21492	0.98338
Scr-Sep50	11.64479	9.48331	0.27544	0.98124
Scr-Sep83	13.18658	9.65851	0.36037	0.98106
Sep	13.12407	8.92612	0.3112	0.98269

$$\Gamma = \frac{bX_m C_s}{1 + bC_s} \qquad \text{(Eq. S1)}$$

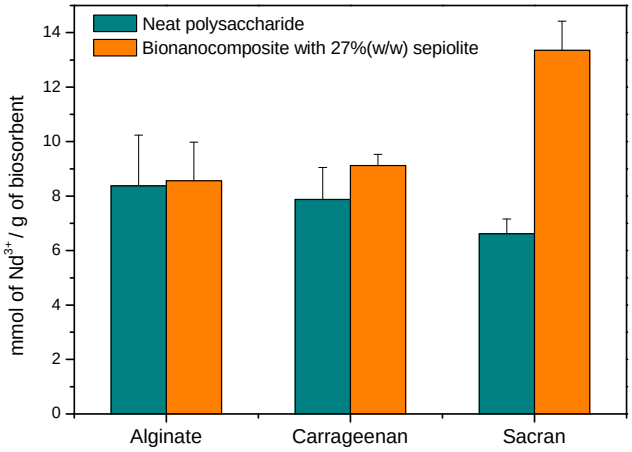

Fig. S5 Comparison of bionanocomposites based on other algae-extracted polysaccharides in the uptake of neodymium ions.

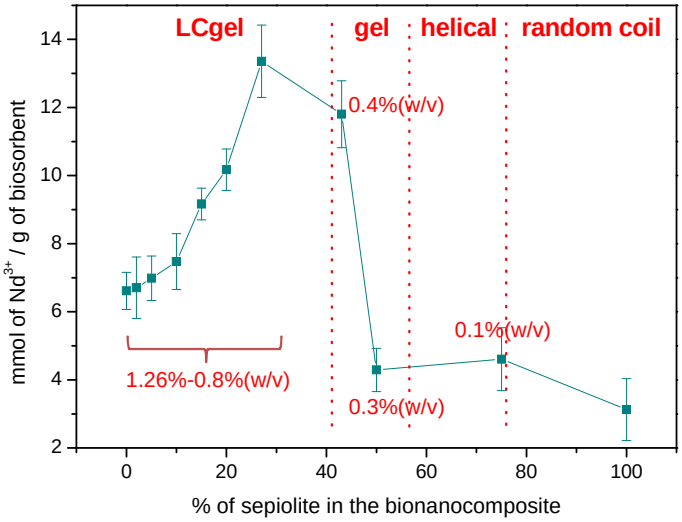

Fig. S6 Neodymium uptake of the sacran-sepiolite bionanocomposites indicating the concentration of the starting solutions of sacran used in the preparation of these biosorbents, together with the organization of the polysaccharide chains in each case.

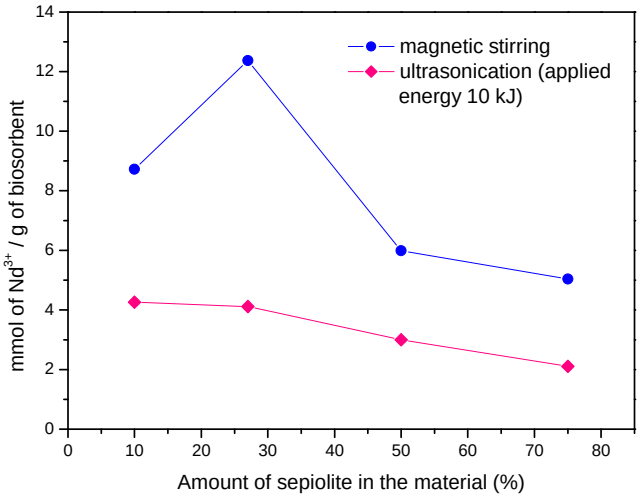

Fig. S7 Neodymium uptake by sacran-sepiolite samples prepared from 0.8%(w/v) starting sacran by mixing the components by magnetic stirring or applying an energy of 10 kJ with an ultrasound tip.