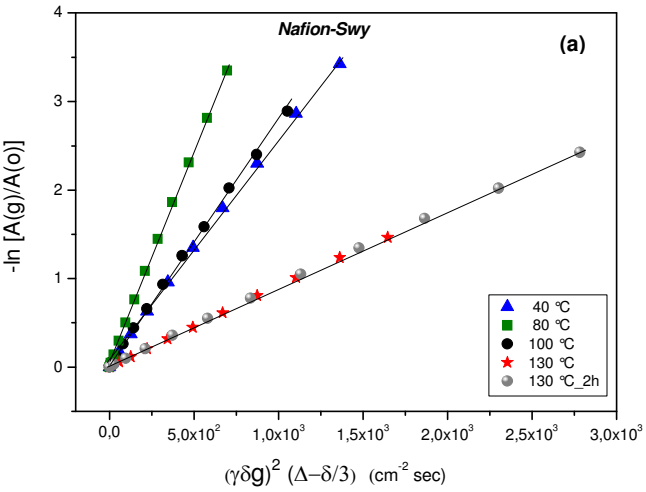
SUPPORTING INFORMATION

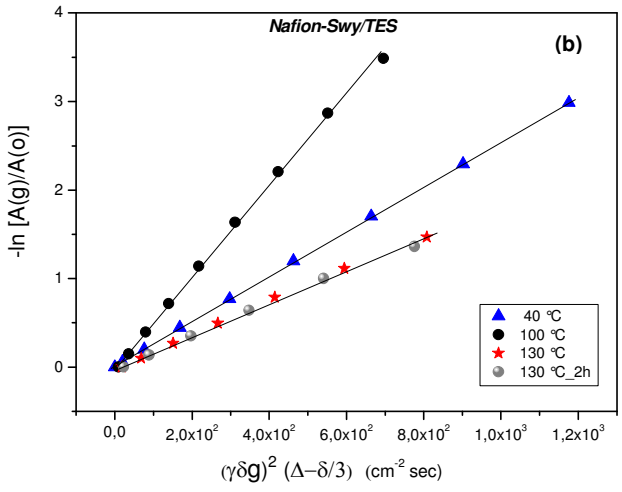
As described in the experimental section, the NMR pulsed field gradient spin-echo (PFG-SE) method was used to measure the water self-diffusion coefficients in the Nafion and composites membranes. The attenuation of the echo amplitude in this sequence is represented by the Stejskal-Tanner equation:

$$-ln\frac{A(g)}{A(0)} = (\gamma g\delta)^2 D(\Delta - \delta/3)$$

Figure S1shows the decay lines of –ln[A(g)/A(0)] vs. g^2(the other parameters are constants) which are used to calculate the self-diffusion coefficients (D), for all the temperature range explored and for the most representative membranes studied.

We can observe that the decay lines are straight for all the systems and, mainly, for all the investigated temperatures. This feature is very important in order to use the above equation to calculate D, and to confirm the Gaussian self-diffusion behaviour of the water confined in the hydrophilic pores of the membranes. Furthermore, it supports the consequence that in such complex systems, with a multiple-component water configuration, we measure only one diffusion value which is a weighted average from the different water species in fast rate of proton exchange.





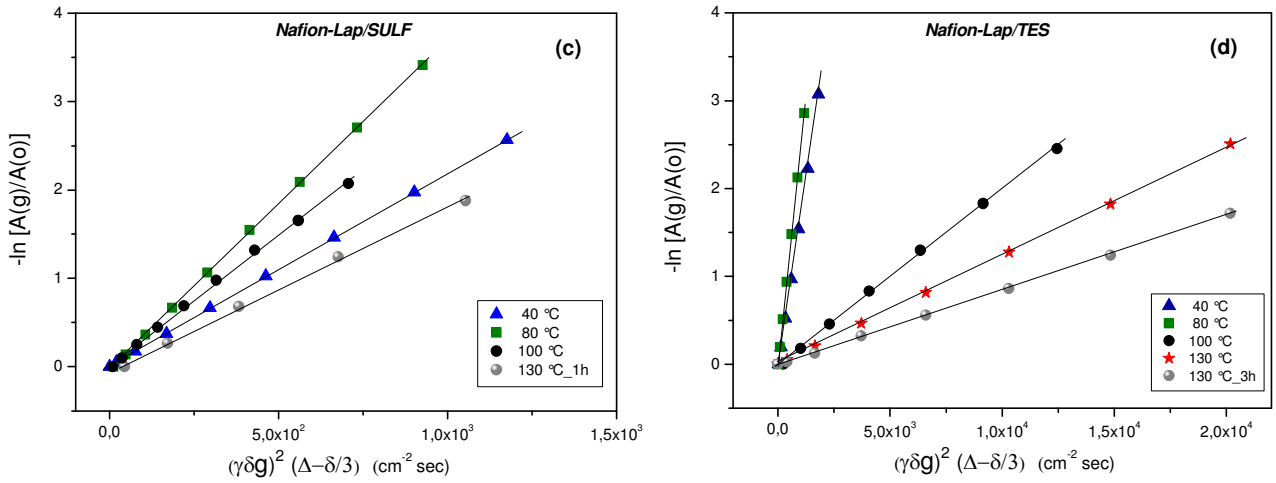


Figure S1. Decay lines of –ln[A(g)/A(0)] vs. $(\gamma g\delta)^2(\Delta-\delta/3)$ for various temperatures of four Nafion composite membranes: a) Nafion-Swy, b) Nafion-Swy/TES , c) Nafion-Lap/Sulf and d) Mafion-Lap-TES.

Figure S2 shows a representative examples of deconvolution of the XRD diffractograms at 2Θ= 10-24^{o} of Nafion membranes. Fit curves of experimental data are deconvoluted into an amorphous (16^{o}) and crystalline (17.5^{o}) scattering peaks.

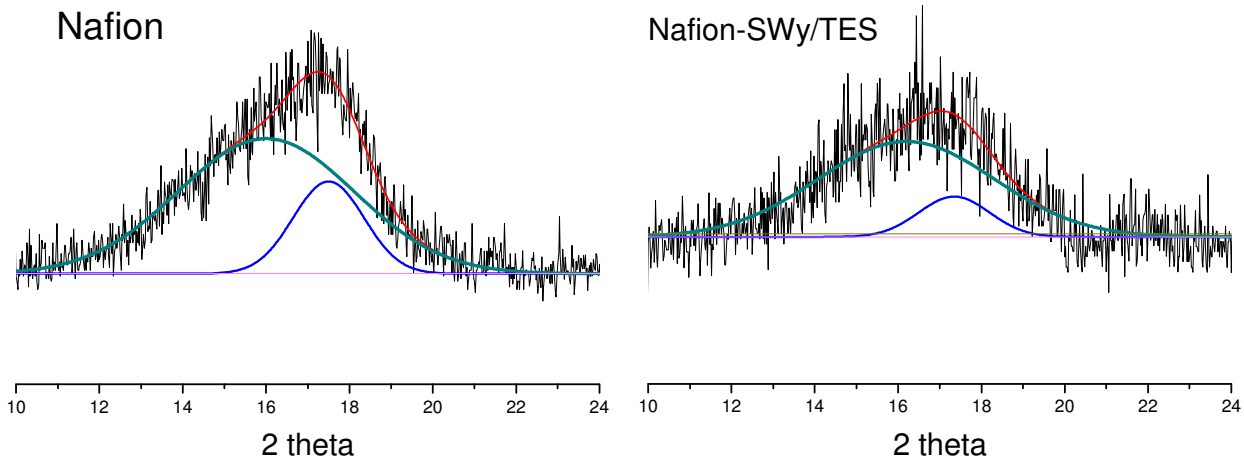


Figure S2. X-ray diffraction patterns of recast Nafion (A) and composite membrane Nafion-SWy/TES (B).

Fitting results		***Position***	***Width***	***Area***	
Nafion	1st Peak	17.50012	2.02801	35.5565	(21.4687%)
	2nd Peak	16.00320	4.99467	130.064	(78.5313%)
Nafion-SWy/TES	1st Peak	17.3458	2.00027	29.1648	(14.4862%)
	2nd Peak	16.1948	4.99001	172.163	(85.5138%)