

## Appendix 1: Calculation of low q limit of NMR echo decay.

From eq.1 in the text, in the limit of low q we can write:

$$\lim_{q \rightarrow 0} E(q, t_d) = \lim_{q \rightarrow 0} \int \bar{P}(z, t_d) e^{(iqz)} dz \quad (1)$$

using exponential series expansion:

$$e^{(z)} = \sum_{n=0}^{\infty} \frac{z^n}{n!} \quad (2)$$

we had:

$$\int \bar{P}(z, t_d) e^{(iqz)} dz = \sum_{n=0}^{\infty} \int \bar{P}(z, t_d) \frac{(iqz)^n}{n!} dz \quad (3)$$

since for odd indices the integral function is odd the corresponding integrals are null. Therefore, we had:

$$\int \bar{P}(z, t_d) e^{(iqz)} dz = 1 - \frac{q^2}{2} \int \bar{P}(z, t_d) z^2 dz + \frac{q^4}{4!} \int \bar{P}(z, t_d) z^4 dz + \dots \quad (4)$$

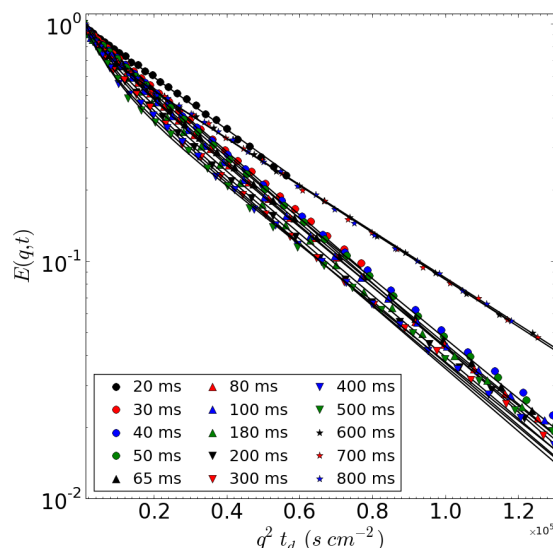
and in the limit of  $q \rightarrow 0$

$$E(q, t_d) \approx 1 - \frac{q^2}{2} \overline{z^2} \approx e^{(-\frac{q^2 \overline{z^2}}{2})} \quad (5)$$

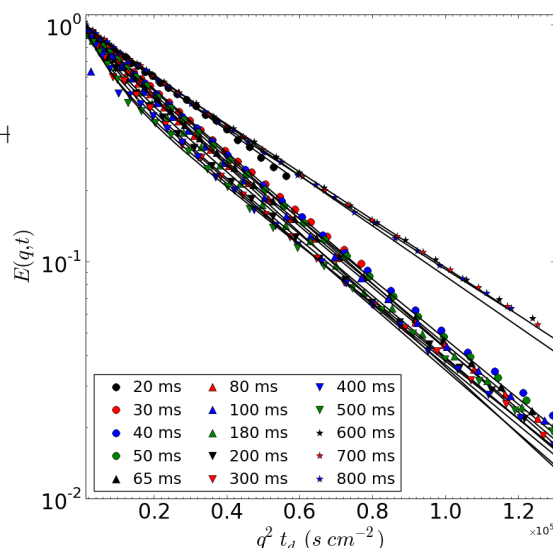
being

$$\overline{z^2} = \int \bar{P}(z, t_d) z^2 dz \quad (6)$$

## Appendix 2: Echo decays for the data relative to figs 9 and 10.

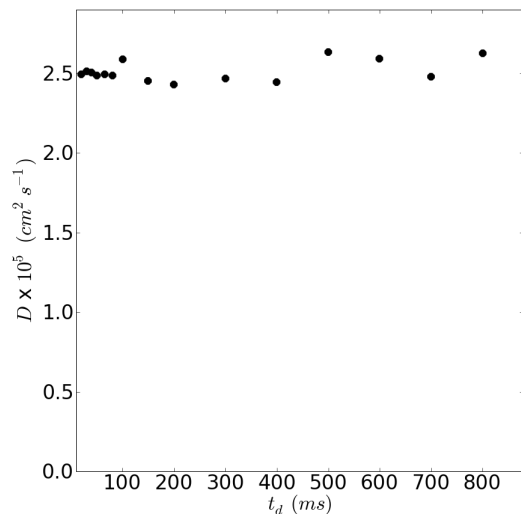


**Figure 1** NMR PGSE decay of water, along the parallel direction, in the ScIg/borax tablets (R=0.5) vs.  $q^2 t_d$ .

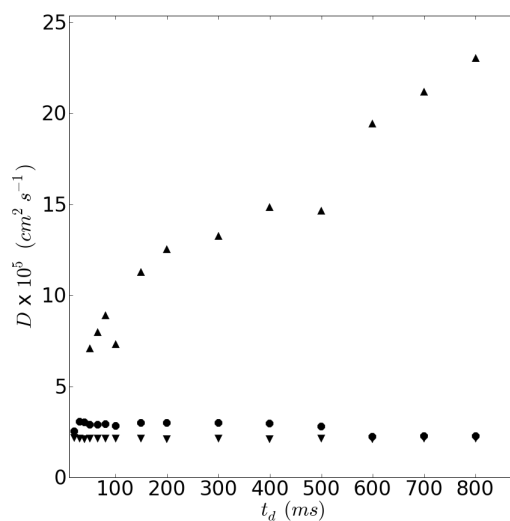


**Figure 2** NMR PGSE decay of water, along the parallel direction, in the ScIg/borax tablets (R=1.0) vs.  $q^2 t_d$ .

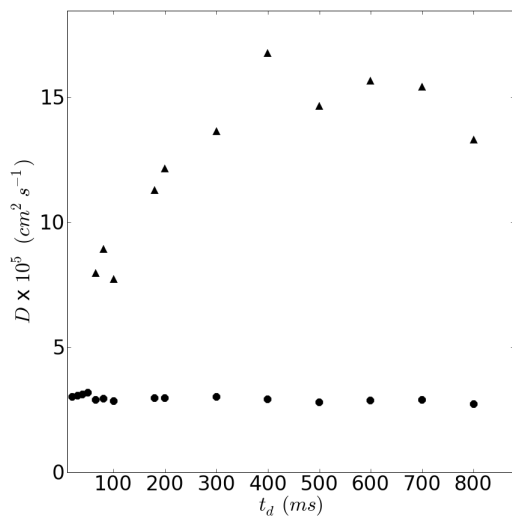
## Appendix 3: Apparent diffusion coefficients



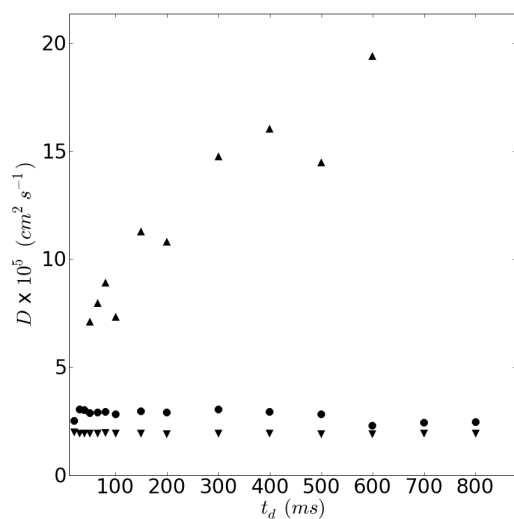
**Figure 3** Apparent diffusion coefficients of water in the ScIg sample vs. the diffusion time.



**Figure 5** Apparent diffusion coefficients of water in ScIg/borax tablets  $R=0.5$  vs. the diffusion time. Circles (●) and up triangles (▲) represent, respectively, the Gaussian and the enhanced diffusion components along the compression direction ( $\parallel$ ). The down triangles (▼) represent the diffusion along the direction perpendicular ( $\perp$ ) to the compression.



**Figure 4** Apparent diffusion coefficients of water in the ScIg/borax sample ( $R=0.5$ ) vs. the diffusion time. Gaussian diffusion (circles); Enhanced diffusion (triangles).



**Figure 6** Apparent diffusion coefficients of water in Sclg/borax tablets  $R=1.0$  vs. the diffusion time. Circles (●) and up triangles (▲) represent, respectively, the Gaussian and the enhanced diffusion components along the compression direction ( $\parallel$ ). The down triangles (▼) represent the diffusion along the direction perpendicular ( $\perp$ ) to the compression.