Appendix

The relative error propagation on the time-scale obtained from the modeling of each diffusion profile is calculated as follows:

$$\frac{\sigma_t}{t} = \sqrt{\left\{\left(\frac{E_A}{RT}\right)^2\left[\left(\frac{\sigma_{E_A}}{E_A}\right)^2 + \left(\frac{\sigma_T}{T}\right)^2\right] + \left(\frac{\sigma_{\sqrt{4Dt}}}{\sqrt{4Dt}}\right)^2 + \left(\sigma_{ln|D_0|}\right)^2\right\}} \quad (7)$$

where t is diffusion time (s), σ_t is the error in diffusion time, E_A is the activation energy, σ_{E_A} is the error in activation energy, R is the universal gas constant, T is the temperature, σ_T is the uncertainty in temperature, D is the diffusion coefficient, $\sigma_{\sqrt{4Dt}}$ is the error in curve fitting, D_0 is the pre-exponential factor and $\sigma_{\ln|D_0|}$ is the uncertainty in $\ln(D_0)$. $\sigma_{\sqrt{4Dt}}$ is the standard error on '√(4Dt)' obtained by using '√(4Dt)' as a single parameter in the curve fitting. For the curve fitting, predefined fitting functions in OriginLab were used which use Chi-Square tolerance value of $1x10^{-9}$ for an acceptable fit. In the presented results, in $error_1$, the term σ_{E_A} and $\sigma_{\ln|D_0|}$ are ignored as we compare against the results and algorithm presented by Petrone et al. 2016 who have not considered these errors. However, these are important sources of error that come directly from the experimental data on diffusivity. These uncertainties are included in the total error ($Error_2$).