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Electronic Supporting Information for

Mobility of Hydrous Species in Amorphous Calcium/Magnesium Carbonates

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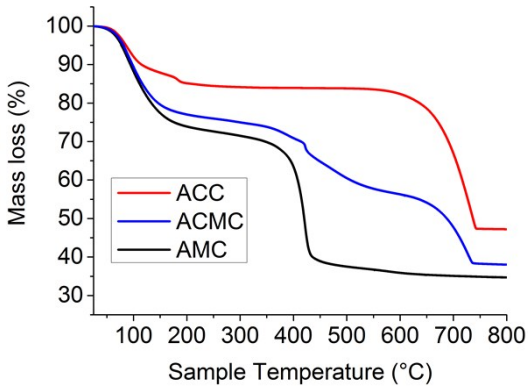
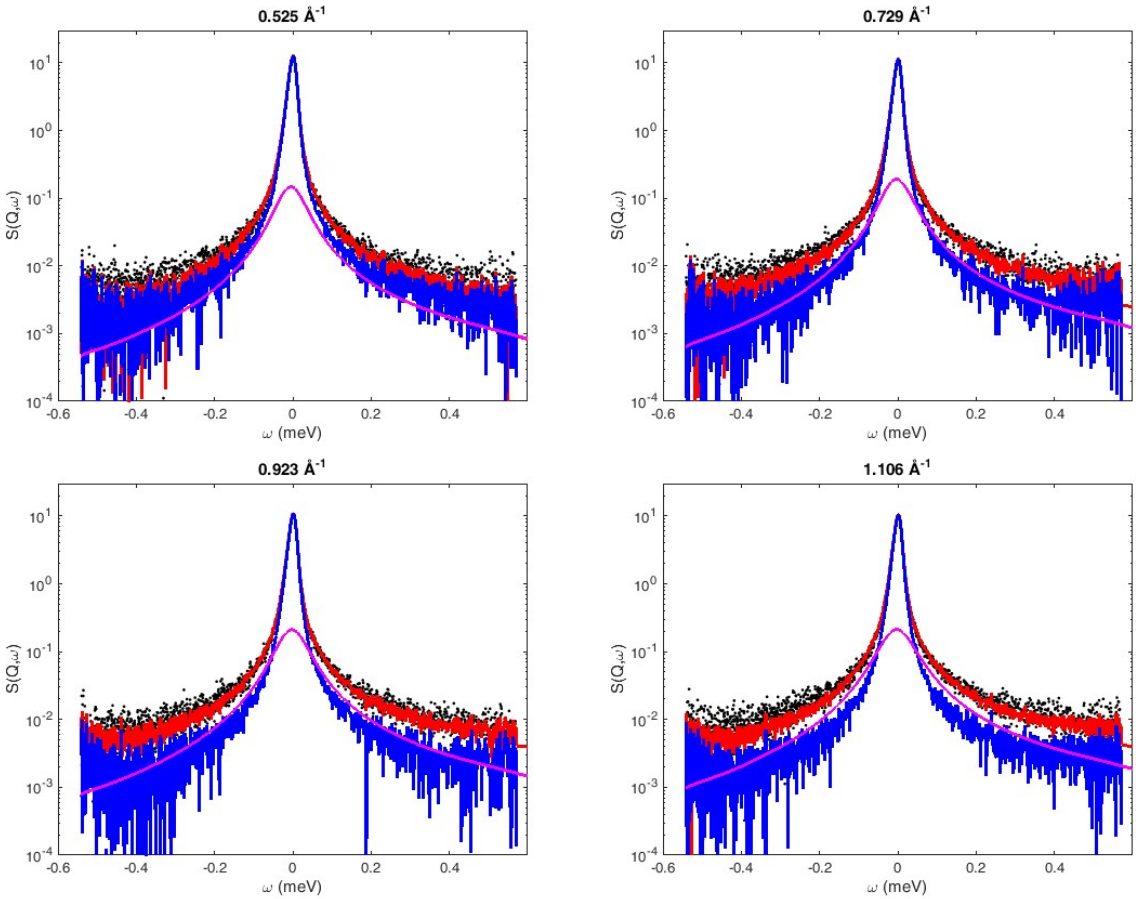


Figure S1: Example TGA measurement of ACC, AMC and ACMC with the composition: $Ca_{0.48}Mg_{0.52}(CO_3)_{0.83}(OH)_{0.33}\cdot 1.1H_2O$



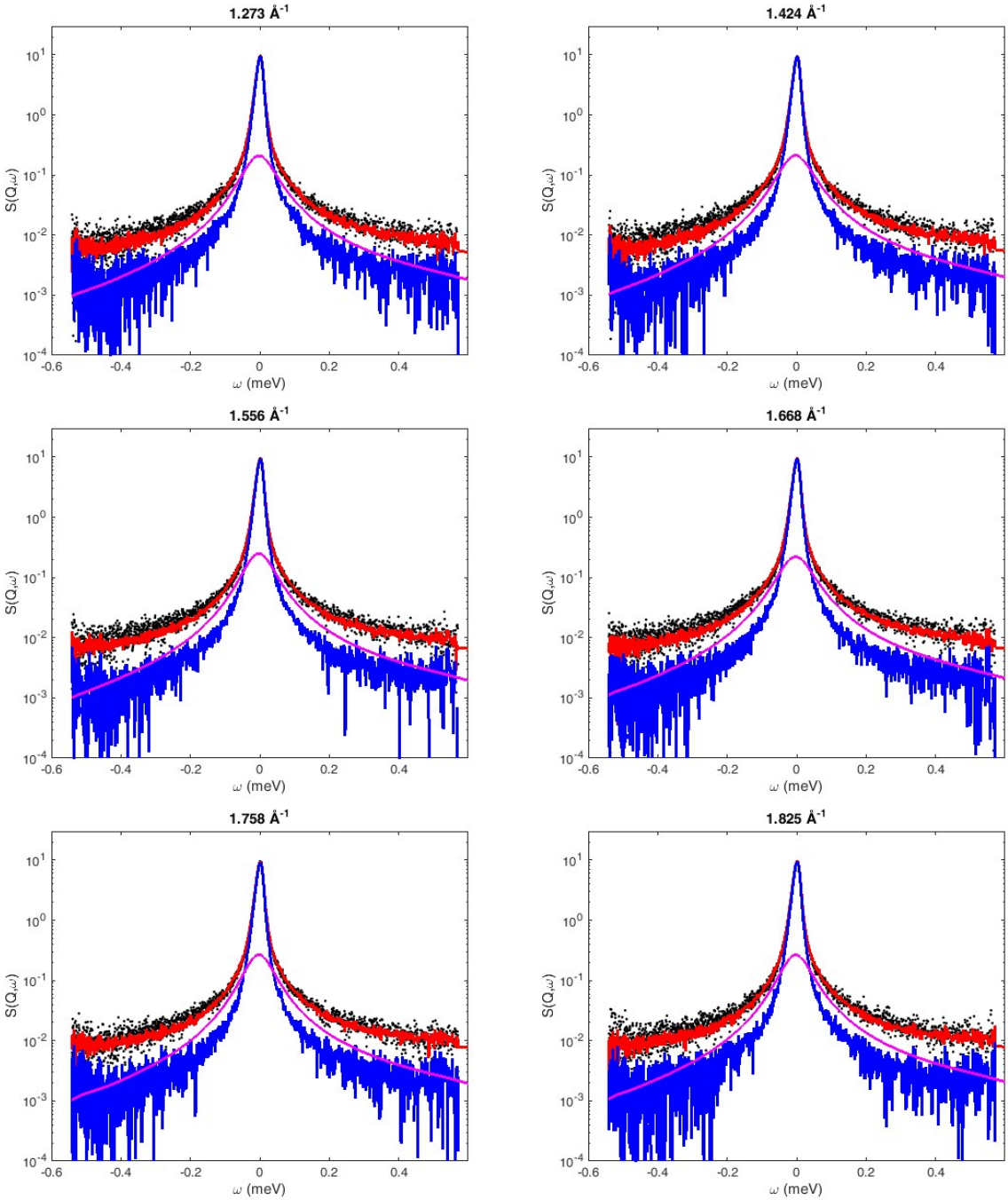
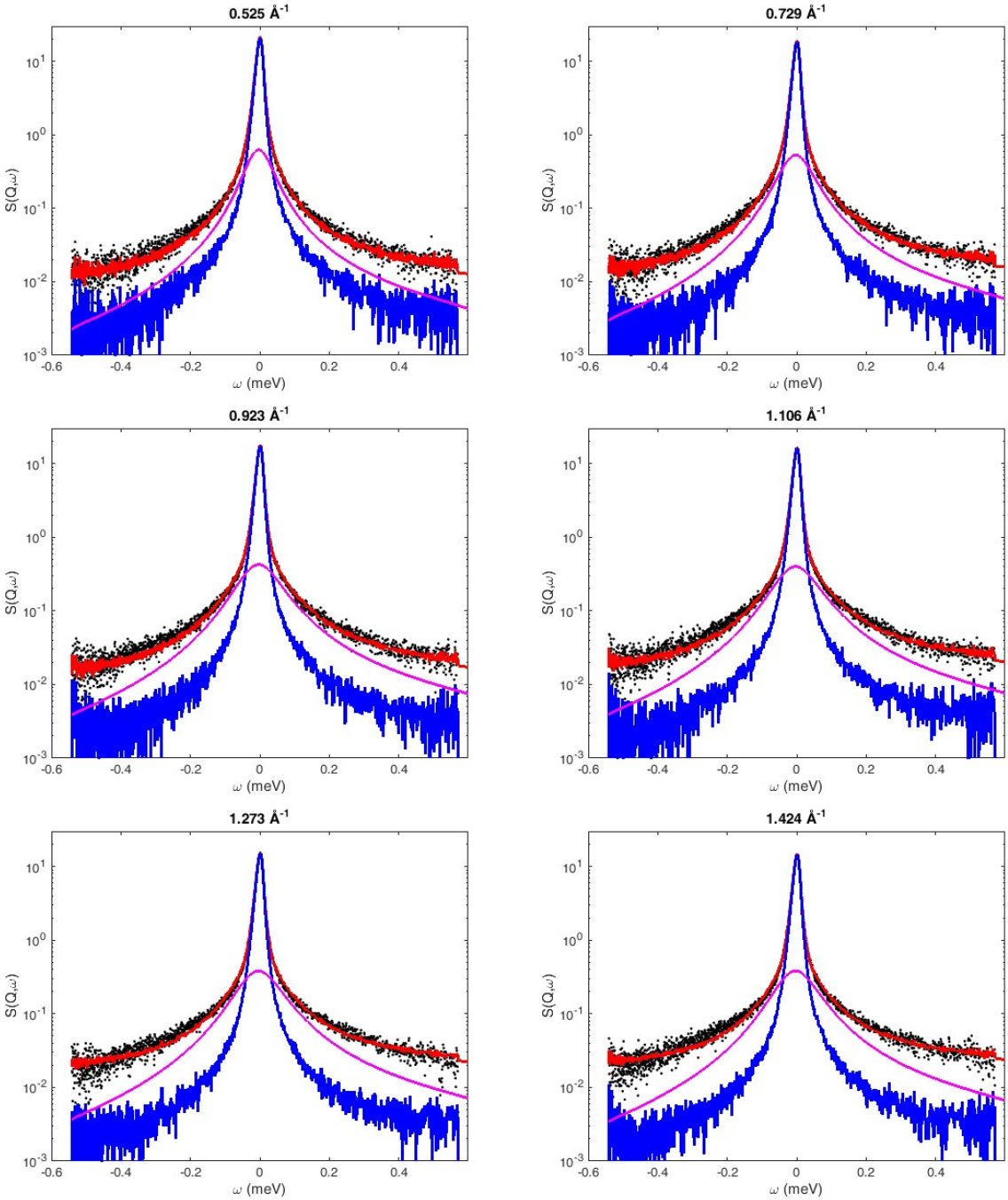


Figure S2: QENS spectra and fit for ACC at 10 different Q values, showing the raw data (black dots), fit (red line), elastic line (blue) and QENS signal (magenta). With the elastic line determined by measuring the sample at 5 K where motion can be neglected and the QENS signal fitted using a convolution of the instrumental resolution (5 K measurement) and a lorentzian peak.


0.525 Å^{-1}
0.729 Å^{-1}
0.923 Å^{-1}
1.106 Å^{-1}
1.273 Å^{-1}
1.424 Å^{-1}
S(Q,ω)
ω (meV)
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
-0.6
-0.4
-0.2
0
0.2
0.4

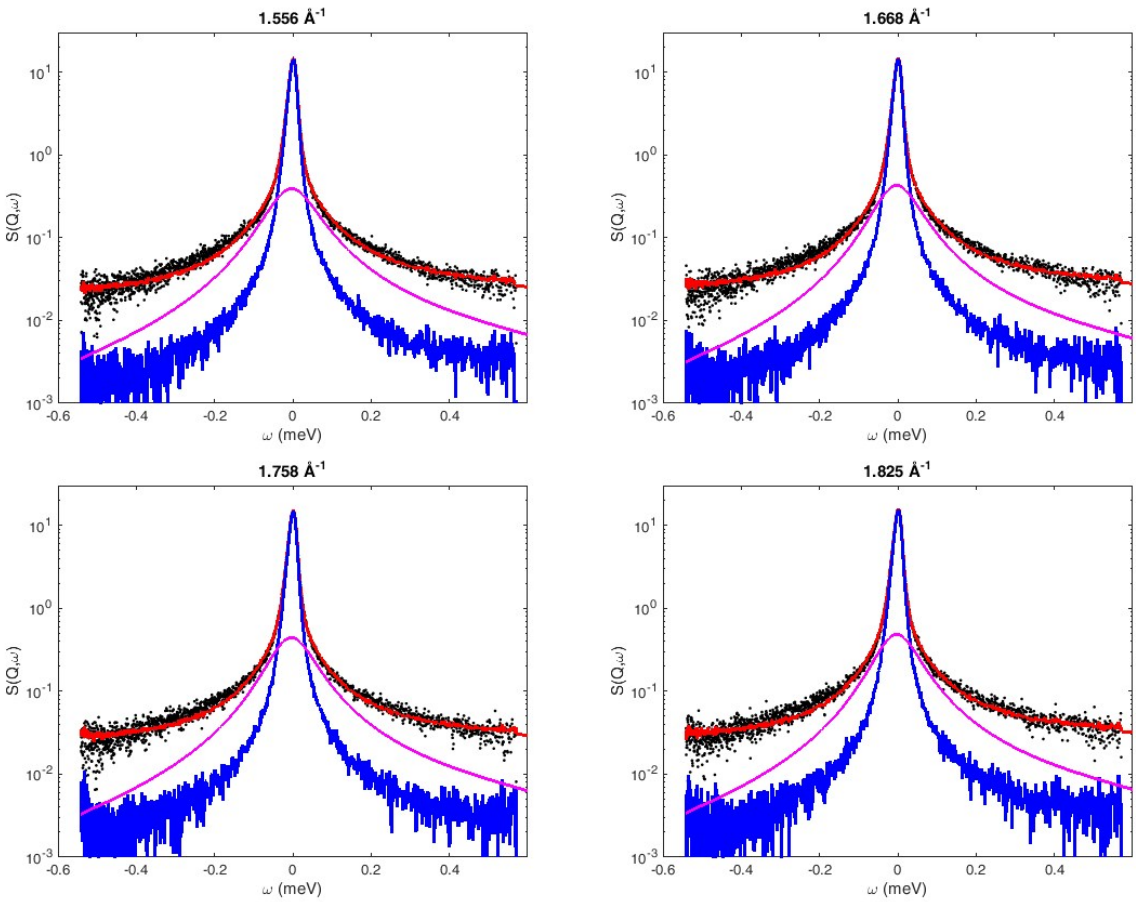


Figure S3: QENS spectra and fit for AMC at 10 different Q values, showing the raw data (black dots), fit (red line), elastic line (blue) and QENS signal (magenta). With the elastic line determined by measuring the sample at 5 K where motion can be neglected and the QENS signal fitted using a convolution of the instrumental resolution (5 K measurement) and a lorentzian peak.

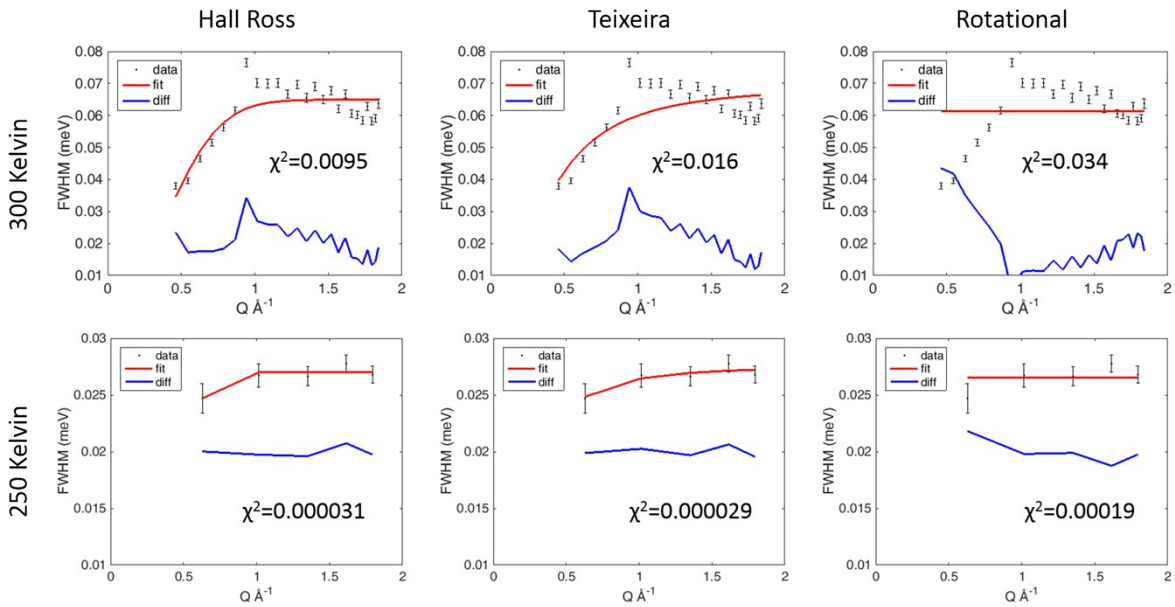


Figure S4: fits of the 3 considered diffusion models for AMC at 250 and 300 kelvin. The Hall Ross[1] model for diffusion with a guassian distribution of jump distances in a confined media between bound states, Teixeira model[2] for diffusion in liquid water and non-translation motion[3] (i.e. rotations).

1. Hall, P. L.; Ross, D. K., Incoherent Neutron Scattering Functions for Random Jump Diffusion in Bounded and Infinite Media. *Molecular Physics* **1981,** *42* (3), 673-682.
2. Teixeira, J.; Bellissent-Funel, M. C.; Chen, S. H.; Dianoux, A. J., Experimental Determination of the Nature of Diffusive Motions of Water Molecules at Low Temperatures. *Physical Review A* **1985,** *31* (3), 1913-1917.
3. Shepherd, P. D.; Kagunya, W. W.; Campbell, S. I.; Chapple, A. P.; Dreyer, J. W.; Humphreys, R. J.; Kemali, M.; Mercer, M.; Ross, D. K., Water Dynamics in Na Zeolite P by QENS. *Physica B: Condensed Matter* **1997,** *234-236*, 914-916.