Supporting Informations

Cation-specific Interactions of Protein Surface Charges in Dilute Aqueous Salt Salutions: A

Combined Study by Dielectric Relaxation Spectroscopy and Raman Spectroscopy

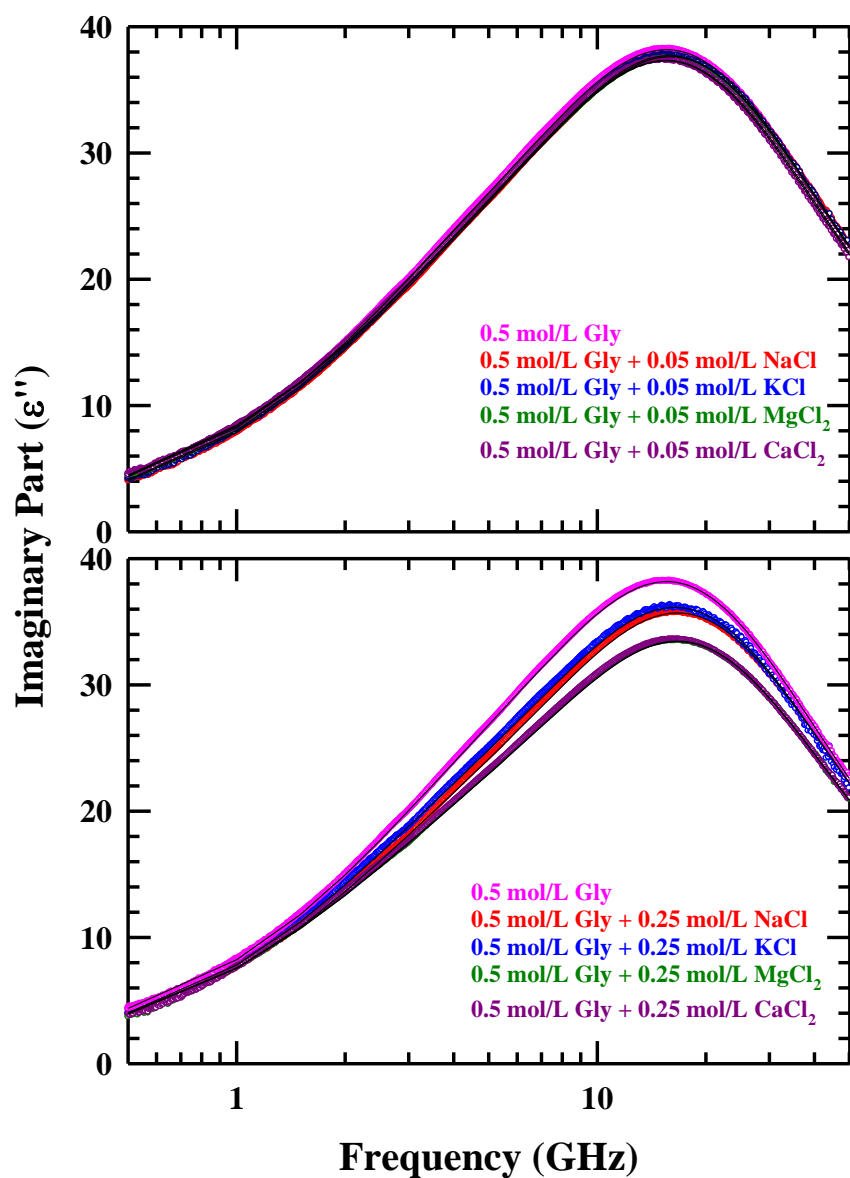K. Mukherjee, G. Schwaab and M. Havenith

Fig. S1: Cation dependence of the imaginary (ε'') parts of the measured DR spectra for electrolyte containing glycine solutions at two different electrolyte concentrations within the frequency regime, $0.5 \leq \nu / \mathrm{GHz} \leq 50$. Solid lines through these data represent fits using 3D relaxation model and upper panel represents the DRS spectra for (0.05 mol/L electrolyte + 0.5 mol/L glycine) and lower panel shows the DRS spectra for (0.25 mol/L electrolyte + 0.5 mol/L glycine). DRS data are color-coded.
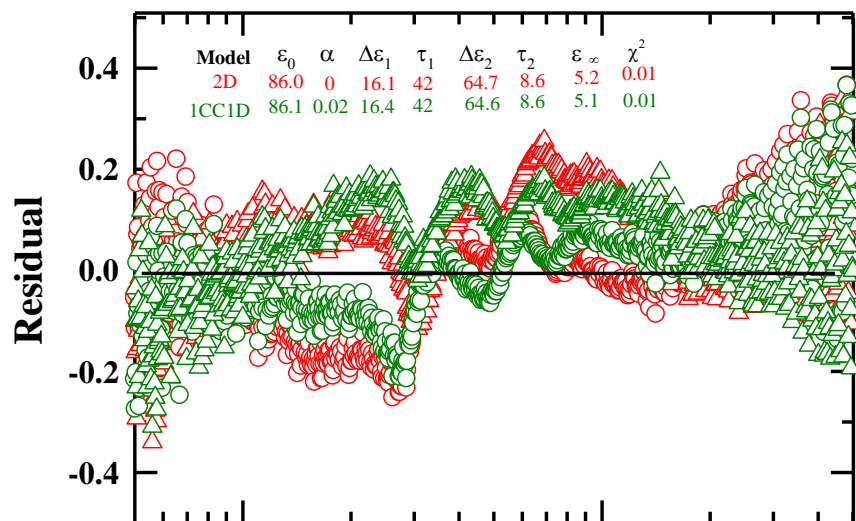
Fig. S2: A representative comparison between the two fitting models. Circles and triangles represent the real and imaginary part of the DR data for 0.25 mol/L aqueous *NaCl* solution, respectively. Representations are color coded.
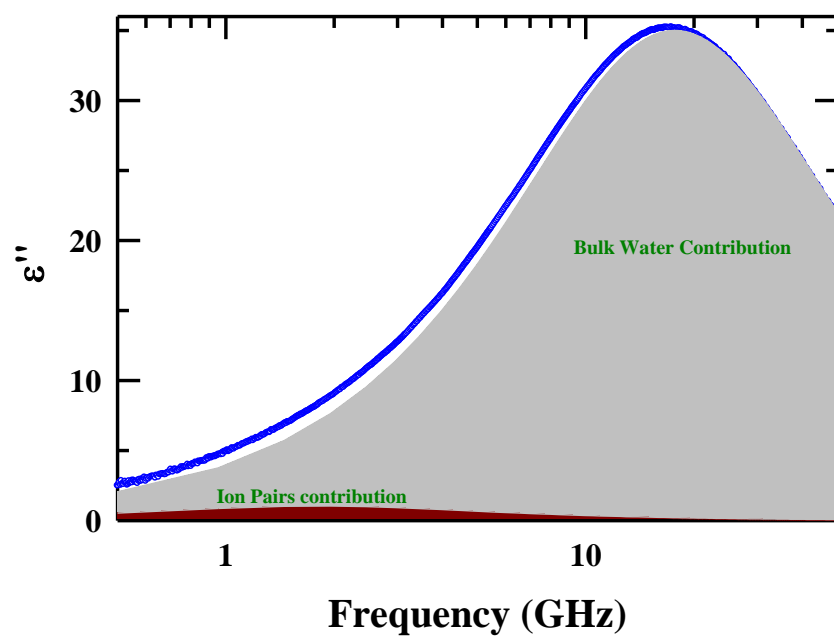
Fig. S3: Imaginary part of the complex dielectric response of 0.1 mol/L aqueous $MgCl_2$ solution. Different DR contributions are represented by color coding.
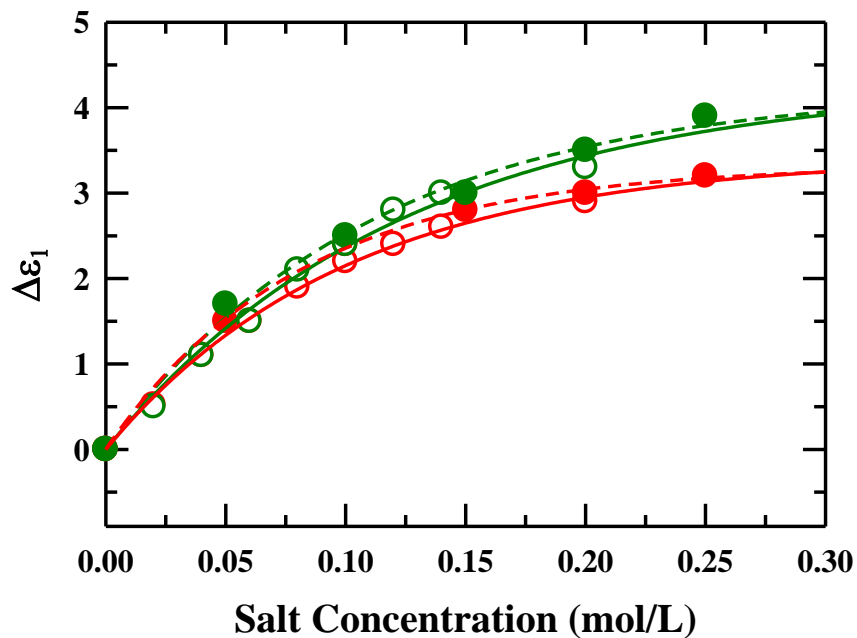
Fig. S4: Salt concentration dependence of $\Delta\varepsilon_1$ for $MgCl_2$ and $CaCl_2$ solutions. Filled circles (red for $MgCl_2$ and green for $CaCl_2$) represent data for solution containing glycine and open circles represent data for solutions without glycine. Lines (continuous lines for without glycine and dashed lines for with glycine) passing through the data points represents exponential rise to a maximum fit ($y = a(1 - e^{-bx})$).
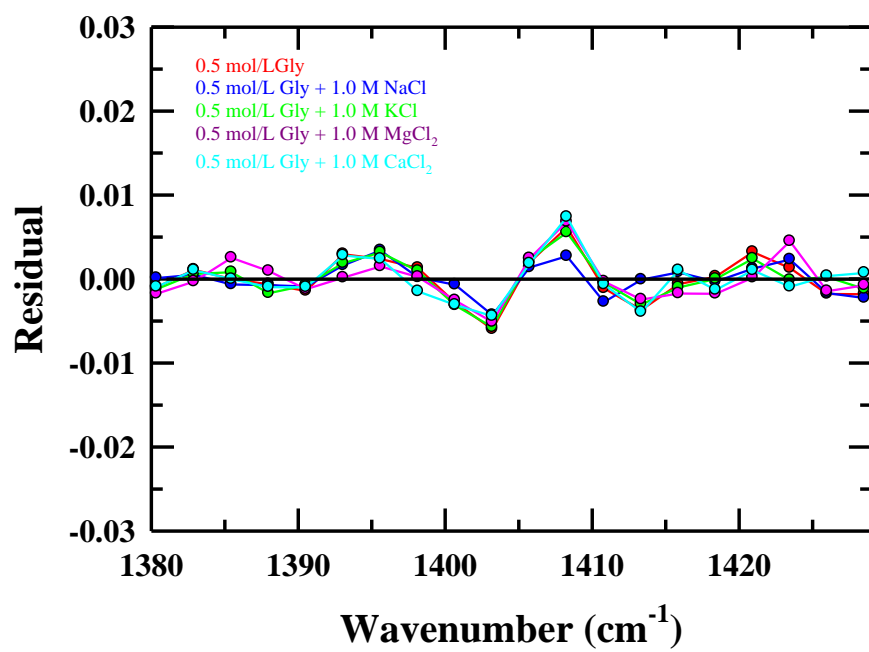
Fig. S5: Residuals for the Voigt fit of the experimental Raman spectroscopy data for glycine solutions having 1.0 mol/L salt concentration. Presentation is color-coded.
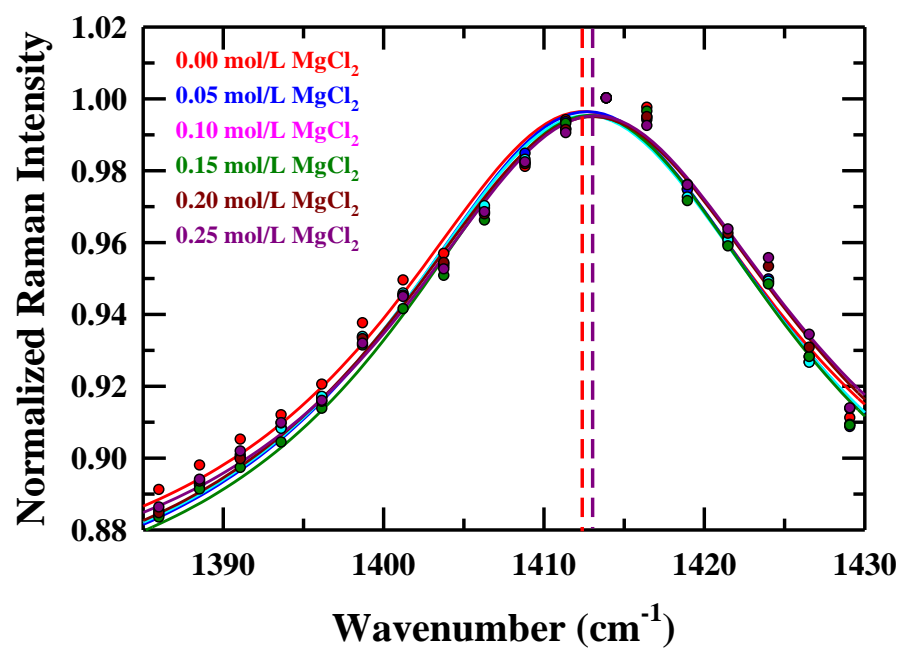
Fig. S6: Experimental and fitted (Voigt) RS data for COO^- symmetric stretching mode of glycine in glycine (0.5 mol/L) containing $MgCl_2$ solutions. Presentation is color-coded.