Supplementary Materials: Ultrafast vibrational dynamics of aqueous acetate and terephthalate

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FIG. 1. Anisotropy of the transient signals as a function of detection frequency at selected excitation frequencies for a. acetate, detecting v_s ; b. acetate, detecting v_{as} ; c. terephthalate, detecting v_s , d. terephthalate, detecting v_{as}



FIG. 2. Transient signals as a function of waiting time T with detection pulse polarized parallel (||) or (\perp) to excitation pulse for a. acetate ($\omega_{excitation} = 1415 \text{ cm}^{-1}$, $\omega_{detection} = 1565 \text{ cm}^{-1}$); b. terephthalate ($\omega_{excitation} = 1380 \text{ cm}^{-1}$, $\omega_{detection} = 1575 \text{ cm}^{-1}$). Please note that the absolute values of signals are plotted, dashed lines are guides to an eye. Note that for the cross peak the signal measured in perpendicular polarization configuration is higher than the signal measured in parallel polarization configuration.



FIG. 3. Anisotropy of the transient signals as a function of waiting time T at the center of the ground state bleach of diagonal and uphill cross-peaks for a. Acetate, detecting v_{as} ; b. terephthalate, detecting v_{as} ; dashed lines are guides to an eye



FIG. 4. Transient absorption signals of a 0.1 M solution of sodium acetate in D₂O as a function of detection frequency for different waiting times *T*, obtained by integrating the 2D signals over an excitation frequency interval of 100 cm⁻¹ around the maximum frequency of the v_s/v_{as} absorption band. a. Exciting the v_{as} band and detecting in the frequency region of the v_{as} band (diagonal v_{as} signal); b. Exciting the v_{as} band (downhill cross-peak signal); c. Exciting the v_s band and detecting in the frequency region of the v_s band and detecting in the frequency region of the v_s band and detecting in the frequency region of the v_s band (diagonal v_s signal); d. Exciting the v_s band and detecting in the frequency region of the v_s band (diagonal v_s signal); d. Exciting the v_s band and detecting in the frequency region of the v_s band (diagonal v_s signal); d. Exciting the v_s band and detecting in the frequency region of the v_s band (diagonal v_s signal); d. Exciting the v_s band and detecting in the frequency region of the v_s band (diagonal v_s signal); d. Exciting the v_s band and detecting in the frequency region of the v_s band (diagonal v_s signal); d. Exciting the v_s band and detecting in the frequency region of the v_s band (diagonal v_s signal); d. Exciting the v_s band and detecting in the frequency region of the v_s band (diagonal v_s signal); d. Exciting the v_s band and detecting in the frequency region of the v_s band (diagonal v_s signal); d. Exciting the v_s band and detecting in the frequency region of the v_s band (diagonal v_s band (uphill cross-peak signal).



FIG. 5. Transient absorption signals of a 0.05 M solution of disodium terephthalate in D₂O as a function of detection frequency for different waiting times *T*, obtained by integrating the 2D signals over an excitation frequency interval of 100 cm⁻¹ around the maximum frequency of the v_s/v_{as} absorption band. a. Exciting the v_{as} band and detecting in the frequency region of the v_{as} band (diagonal v_{as} signal); b. Exciting the v_{as} band and detecting in the frequency region of the v_s band and detecting in the frequency region of the v_s band (diagonal v_s signal); d. Exciting the v_s band and detecting in the frequency region of the v_s band (diagonal v_s signal); d. Exciting the v_s band and detecting in the frequency region of the v_s band (uphill cross-peak signal).