

Raman Spectrometry as a Tool for an Online Control of a Phototrophic Biological Nutrient Removal Process

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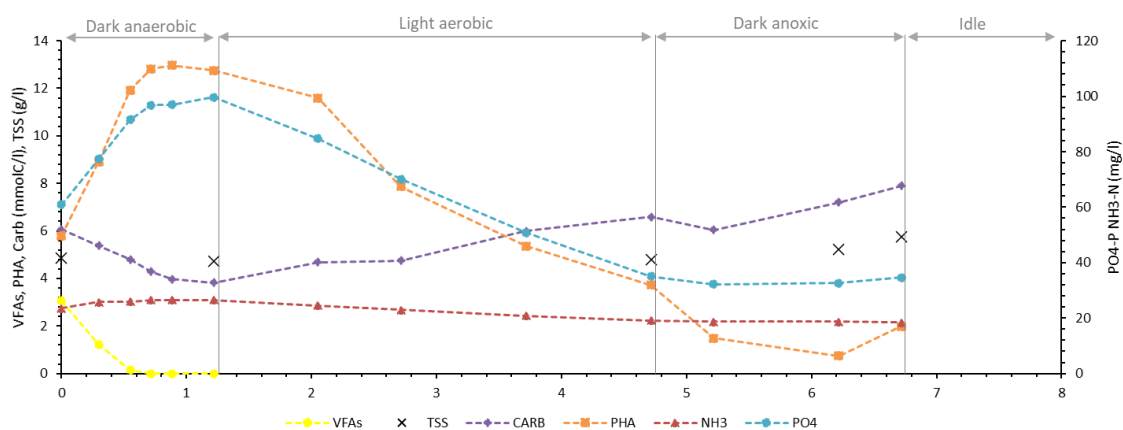


Figure S1. Full cycle of the photo-BNR reactor on day 85 of system operation. Carbohydrates correspond to the sum of bacterial intracellular glycogen and microalgae starch. For details on system operation, please see [14].

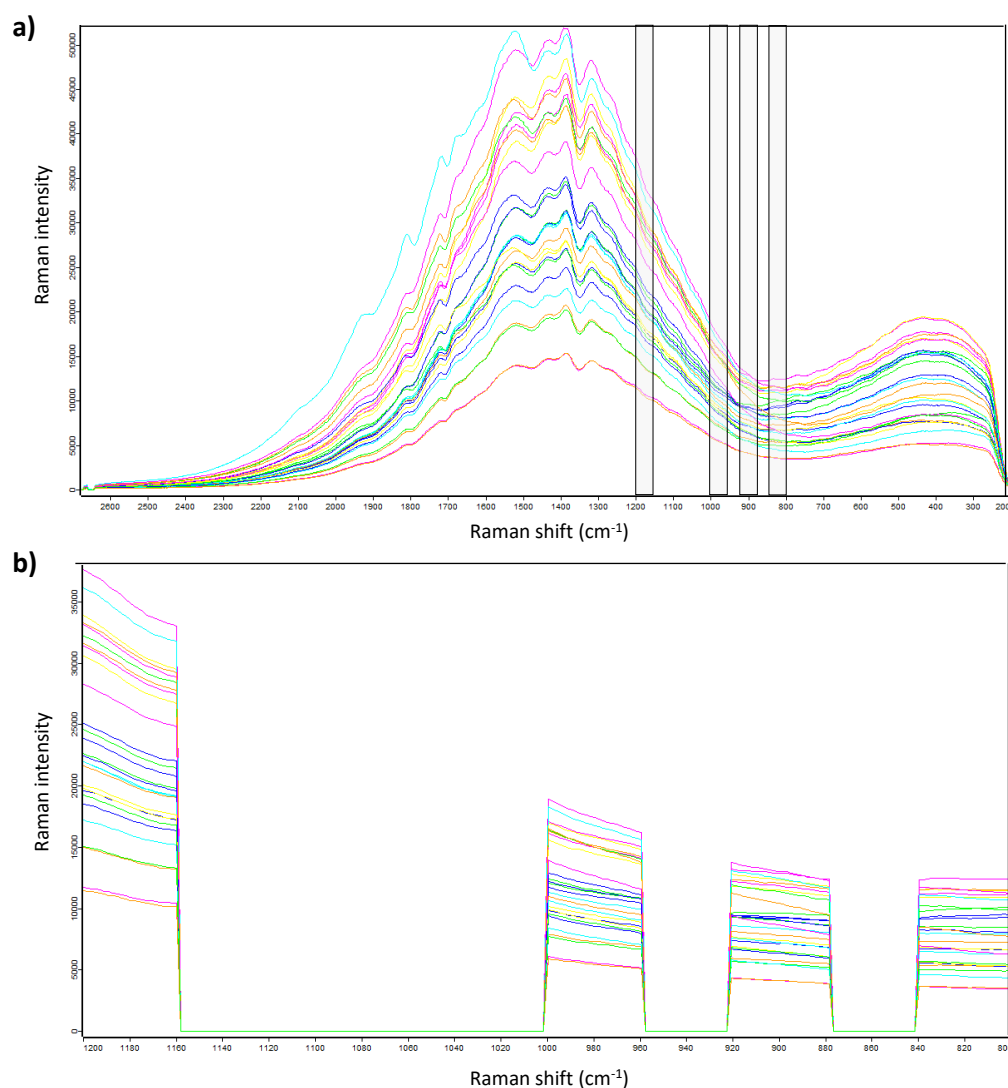


Figure S2. Pre-processed Raman spectra of calibration samples used for the development of the PLS model for total carbohydrates, according to Table 1 in the manuscript: **a)** representation of the total calibration spectra after pre-processing, highlighting the specific Raman shift regions considered during PLS model optimization; and **b)** representation of the spectral data effectively considered in the PLS model, corresponding to the optimized pre-processed Raman spectra.

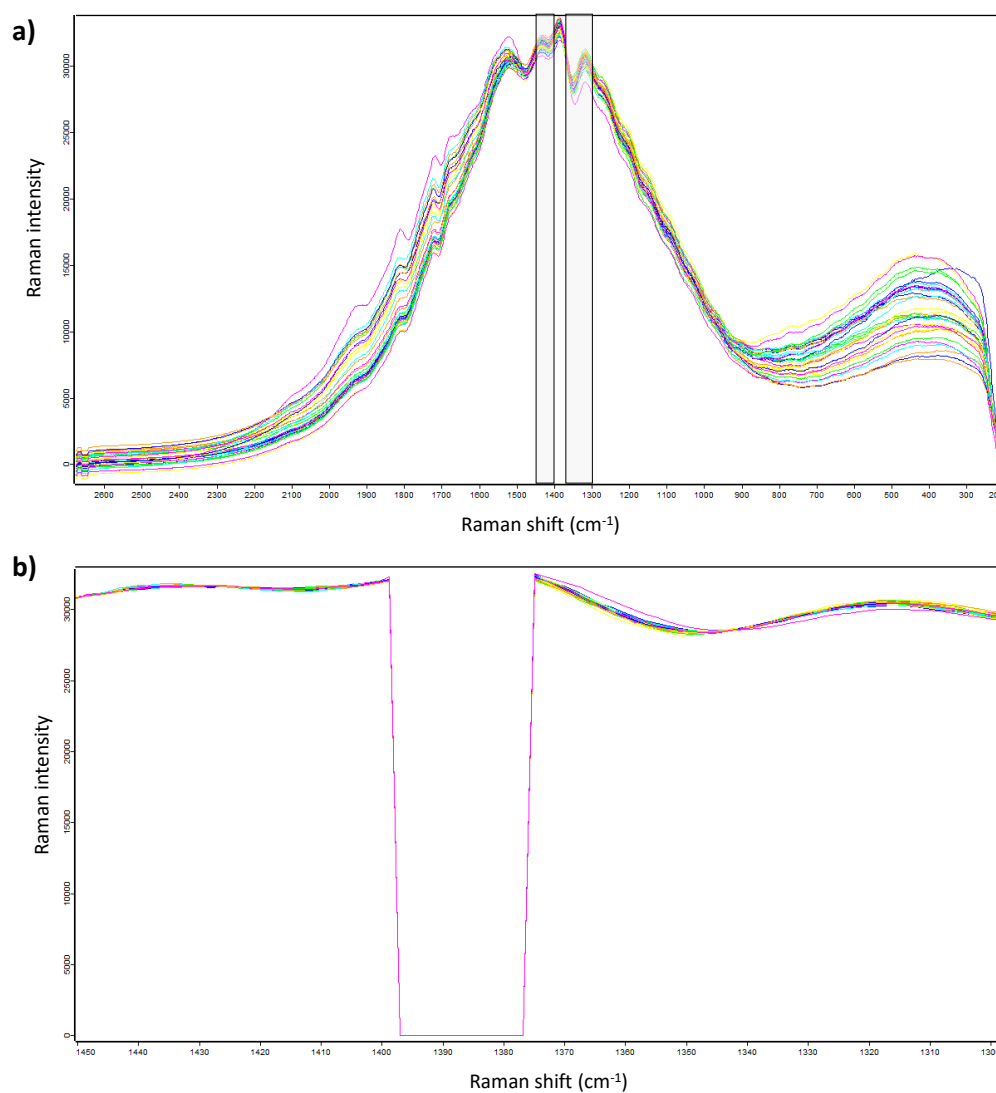


Figure S3. Pre-processed Raman spectra of calibration samples used for the development of the PLS model for carbon dioxide (CO₂), according to Table 1 in the manuscript: **a)** representation of the total calibration spectra after pre-processing, highlighting the specific Raman shift regions considered during PLS model optimization; and **b)** representation of the spectral data effectively considered in the PLS model, corresponding to the optimized pre-processed Raman spectra.

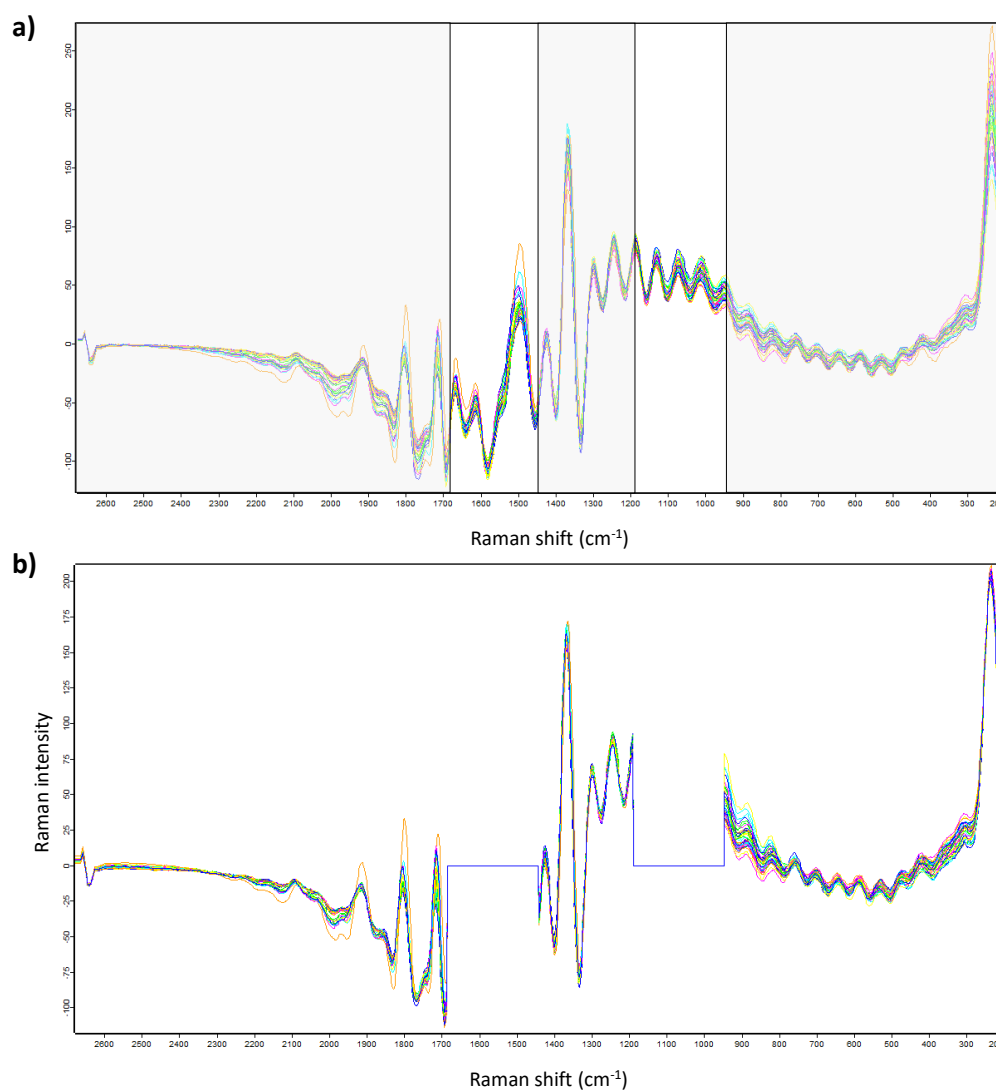


Figure S4. Pre-processed Raman spectra of calibration samples used for the development of the PLS model for ammonia (NH_3), according to Table 1 in the manuscript: **a)** representation of the total calibration spectra after pre-processing, highlighting the specific Raman shift regions considered during PLS model optimization; and **b)** representation of the spectral data effectively considered in the PLS model, corresponding to the optimized pre-processed Raman spectra.

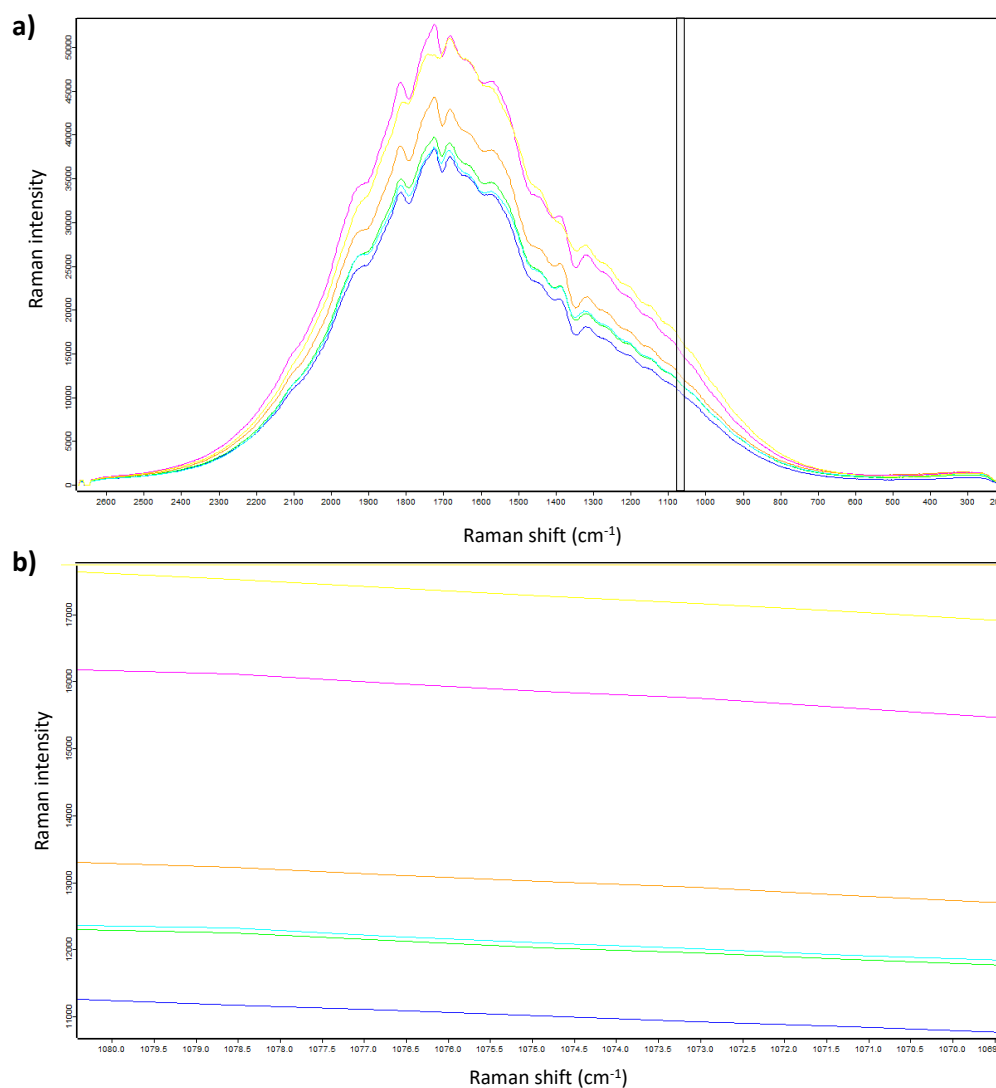


Figure S5. Pre-processed Raman spectra of calibration samples used for the development of the PLS model for nitrate (NO_3), according to Table 1 in the manuscript: **a)** representation of the total calibration spectra after pre-processing, highlighting the specific Raman shift regions considered during PLS model optimization; and **b)** representation of the spectral data effectively considered in the PLS model, corresponding to the optimized pre-processed Raman spectra.

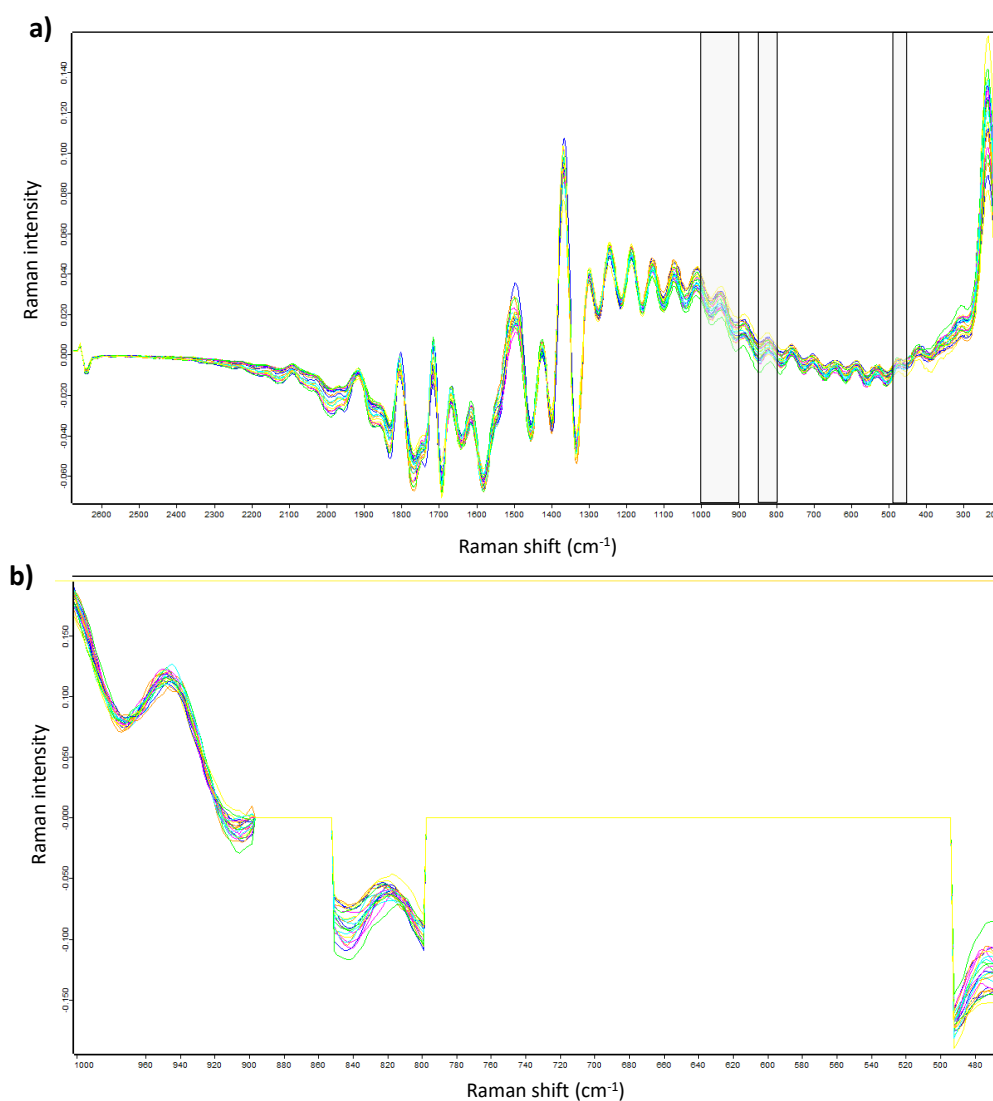


Figure S6. Pre-processed Raman spectra of calibration samples used for the development of the PLS model for polyhydroxyalkanoates (PHAs), according to Table 1 in the manuscript: **a)** representation of the total calibration spectra after pre-processing, highlighting the specific Raman shift regions considered during PLS model optimization; and **b)** representation of the spectral data effectively considered in the PLS model, corresponding to the optimized pre-processed Raman spectra.

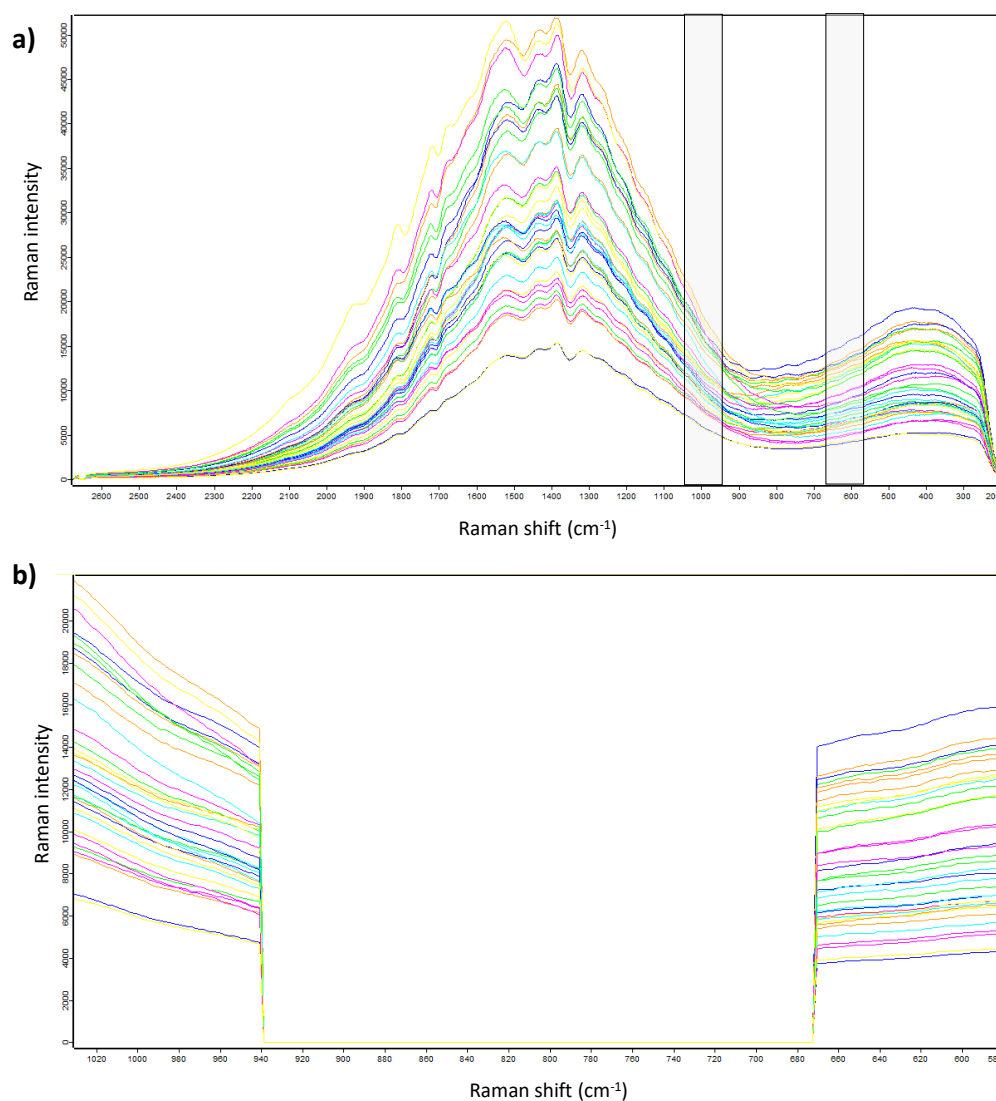


Figure S7. Pre-processed Raman spectra of calibration samples used for the development of the PLS model for phosphate (PO_4), according to Table 1 in the manuscript: **a)** representation of the total calibration spectra after pre-processing, highlighting the specific Raman shift regions considered during PLS model optimization; and **b)** representation of the spectral data effectively considered in the PLS model, corresponding to the optimized pre-processed Raman spectra.

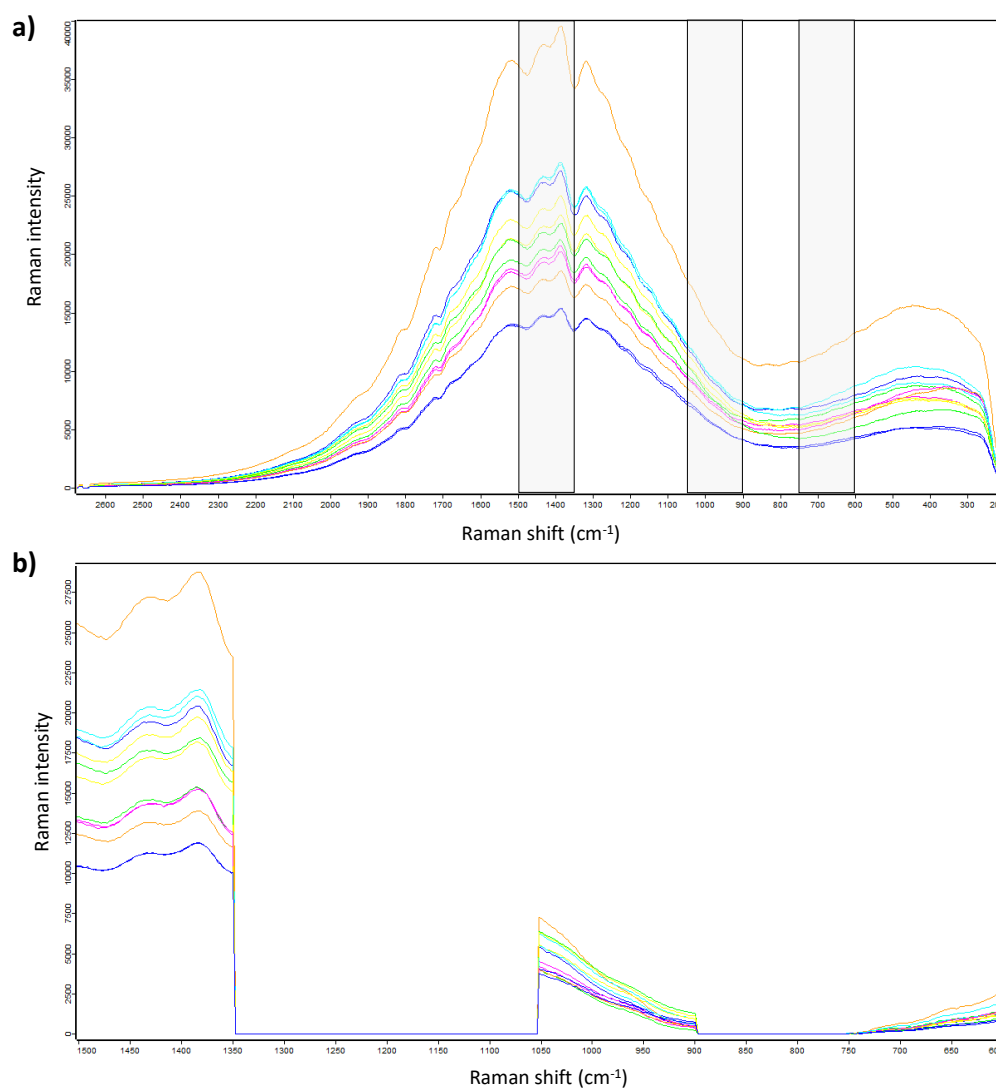


Figure S8. Pre-processed Raman spectra of calibration samples used for the development of the PLS model for total organic content (TOC), according to Table 1 in the manuscript: **a)** representation of the total calibration spectra after pre-processing, highlighting the specific Raman shift regions considered during PLS model optimization; and **b)** representation of the spectral data effectively considered in the PLS model, corresponding to the optimized pre-processed Raman spectra.

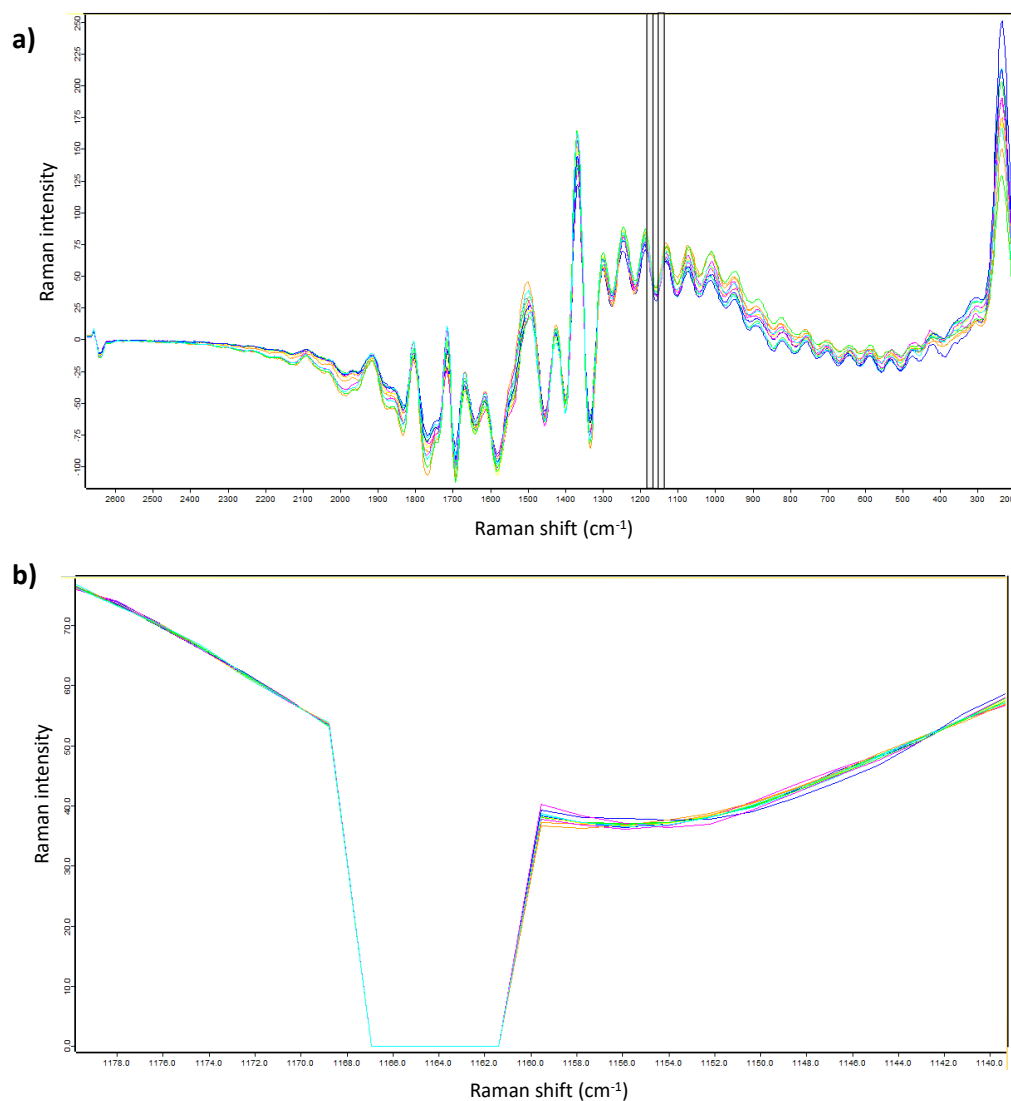


Figure S9. Pre-processed Raman spectra of calibration samples used for the development of the PLS model for total phosphorus (total P), according to Table 1 in the manuscript: **a)** representation of the total calibration spectra after pre-processing, highlighting the specific Raman shift regions considered during PLS model optimization; and **b)** representation of the spectral data effectively considered in the PLS model, corresponding to the optimized pre-processed Raman spectra.

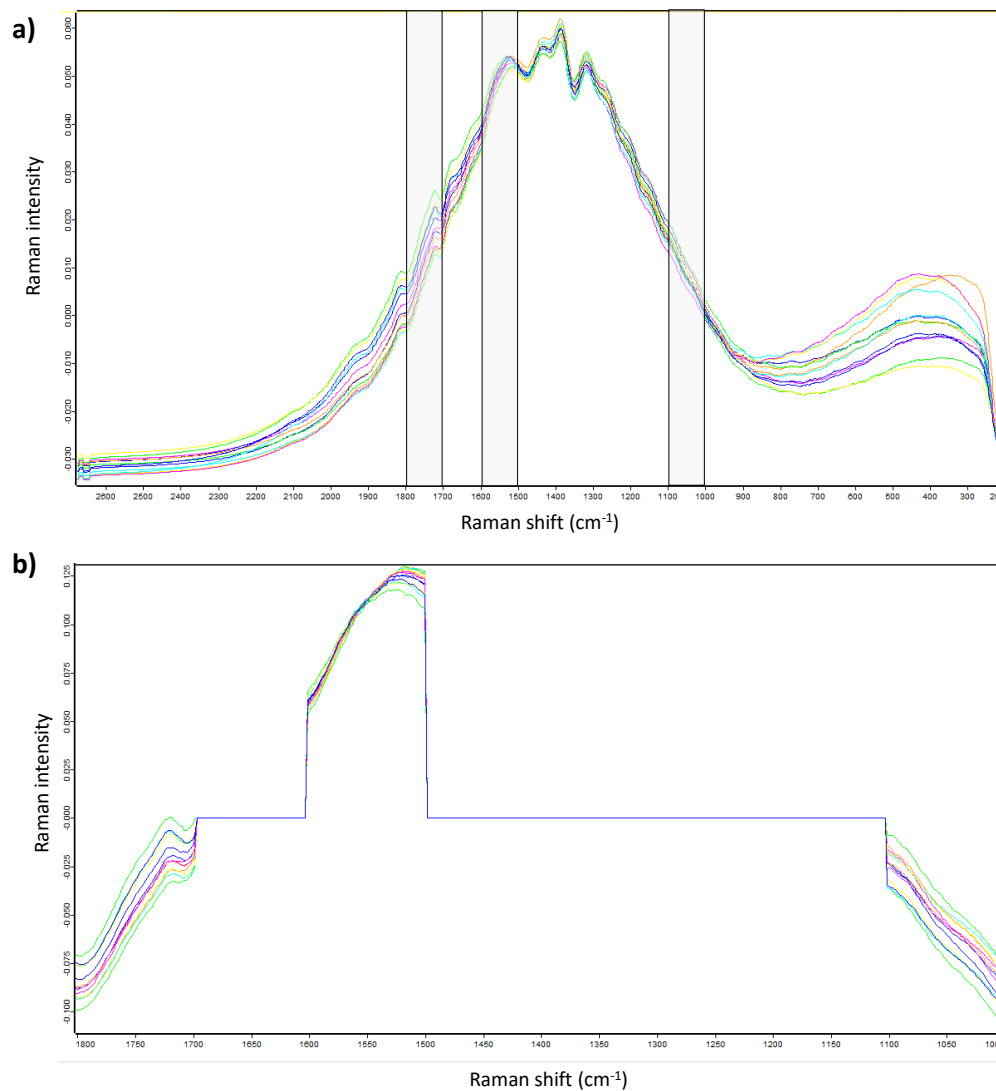


Figure S10. Pre-processed Raman spectra of calibration samples used for the development of the PLS model for total suspended solids (TSSs), according to Table 1 in the manuscript: **a)** representation of the total calibration spectra after pre-processing, highlighting the specific Raman shift regions considered during PLS model optimization; and **b)** representation of the spectral data effectively considered in the PLS model, corresponding to the optimized pre-processed Raman spectra.

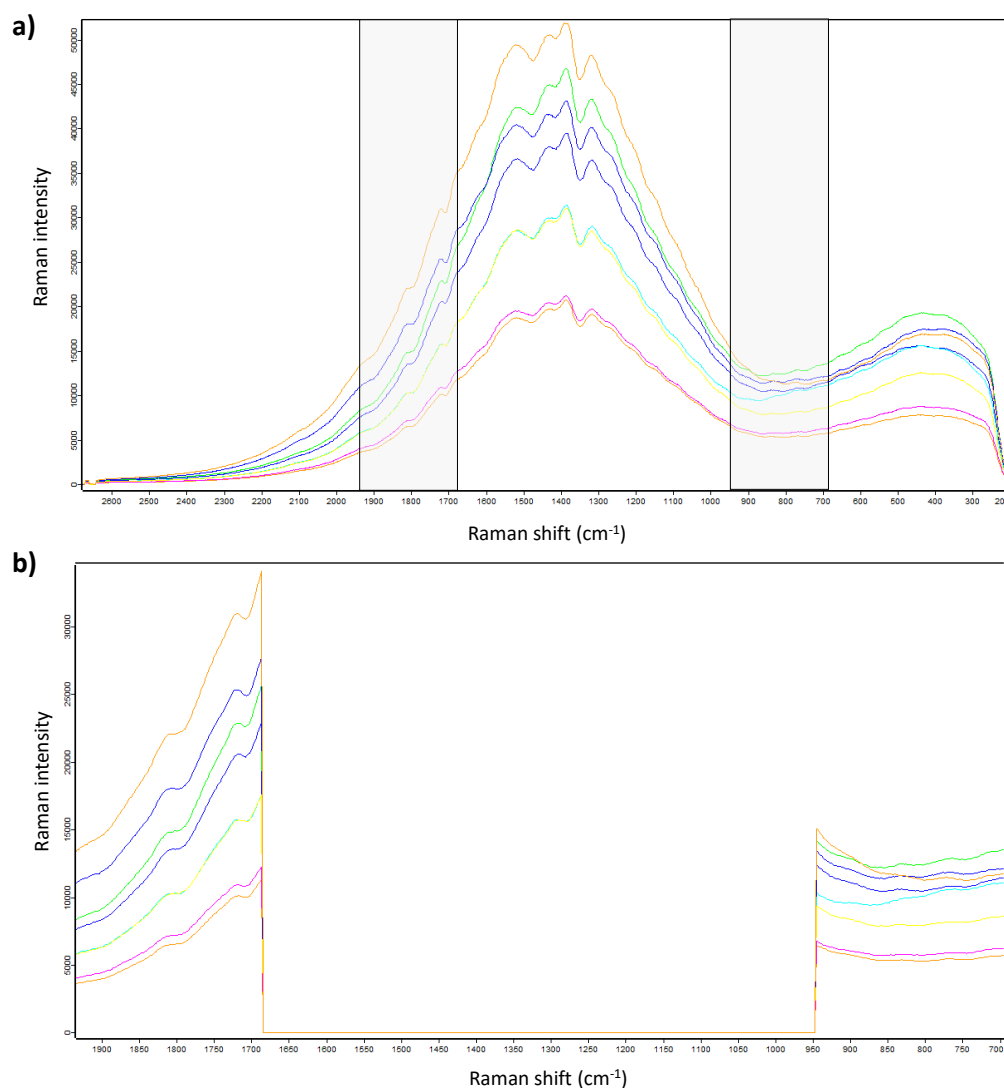


Figure S11. Pre-processed Raman spectra of calibration samples used for the development of the PLS model for volatile fatty acids (VFAs), according to Table 1 in the manuscript: **a)** representation of the total calibration spectra after pre-processing, highlighting the specific Raman shift regions considered during PLS model optimization; and **b)** representation of the spectral data effectively considered in the PLS model, corresponding to the optimized pre-processed Raman spectra.

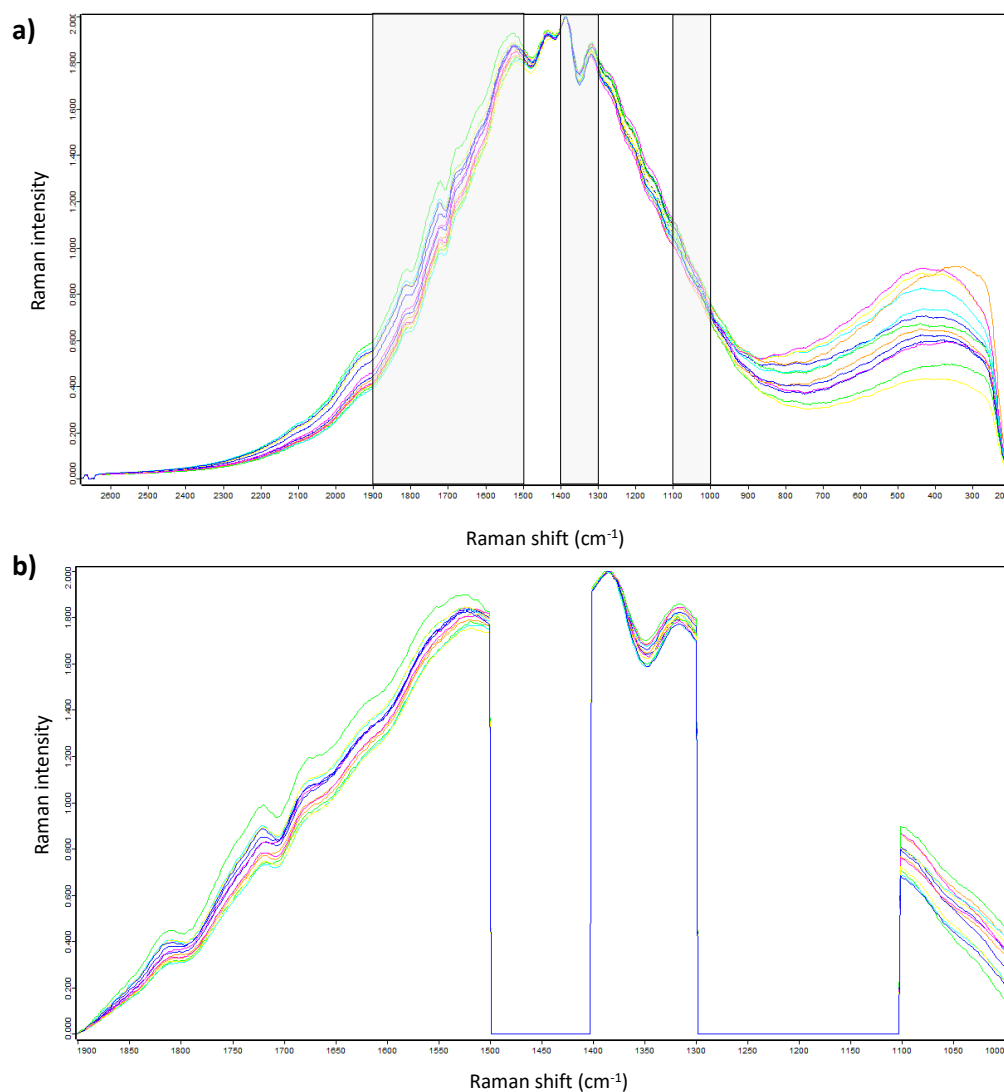


Figure S12. Pre-processed Raman spectra of calibration samples used for the development of the PLS model for volatile suspended solids (VSSs), according to Table 1 in the manuscript: **a)** representation of the total calibration spectra after pre-processing, highlighting the specific Raman shift regions considered during PLS model optimization; and **b)** representation of the spectral data effectively considered in the PLS model, corresponding to the optimized pre-processed Raman spectra.