Electronic Supplementary Material (ESI) for Analyst.

Supplementary information

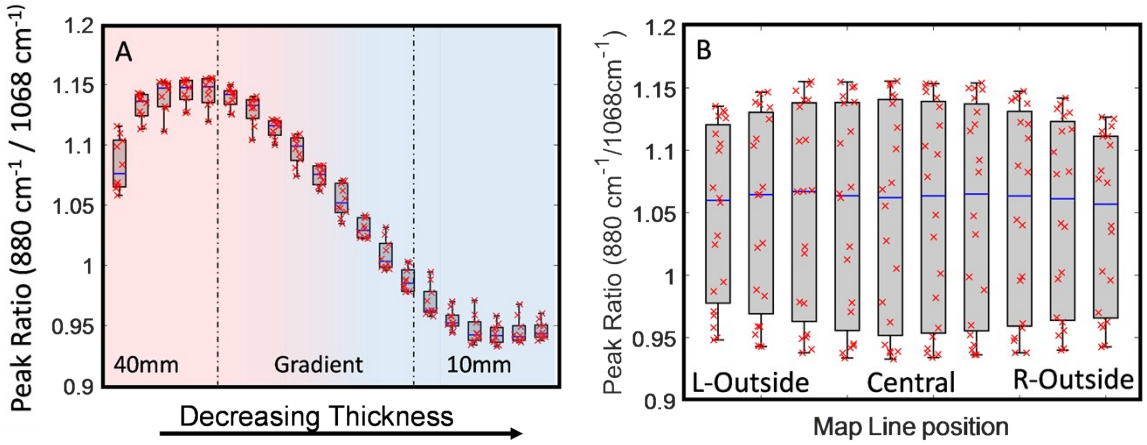

Figure S1| Box and whisker plots of Raman peak ratio of lard (880 cm^{-1} / 1068 cm^{-1}), as measured in lines over similar thickness (**A**), and lines down the gradient of lard thickness (**B**).

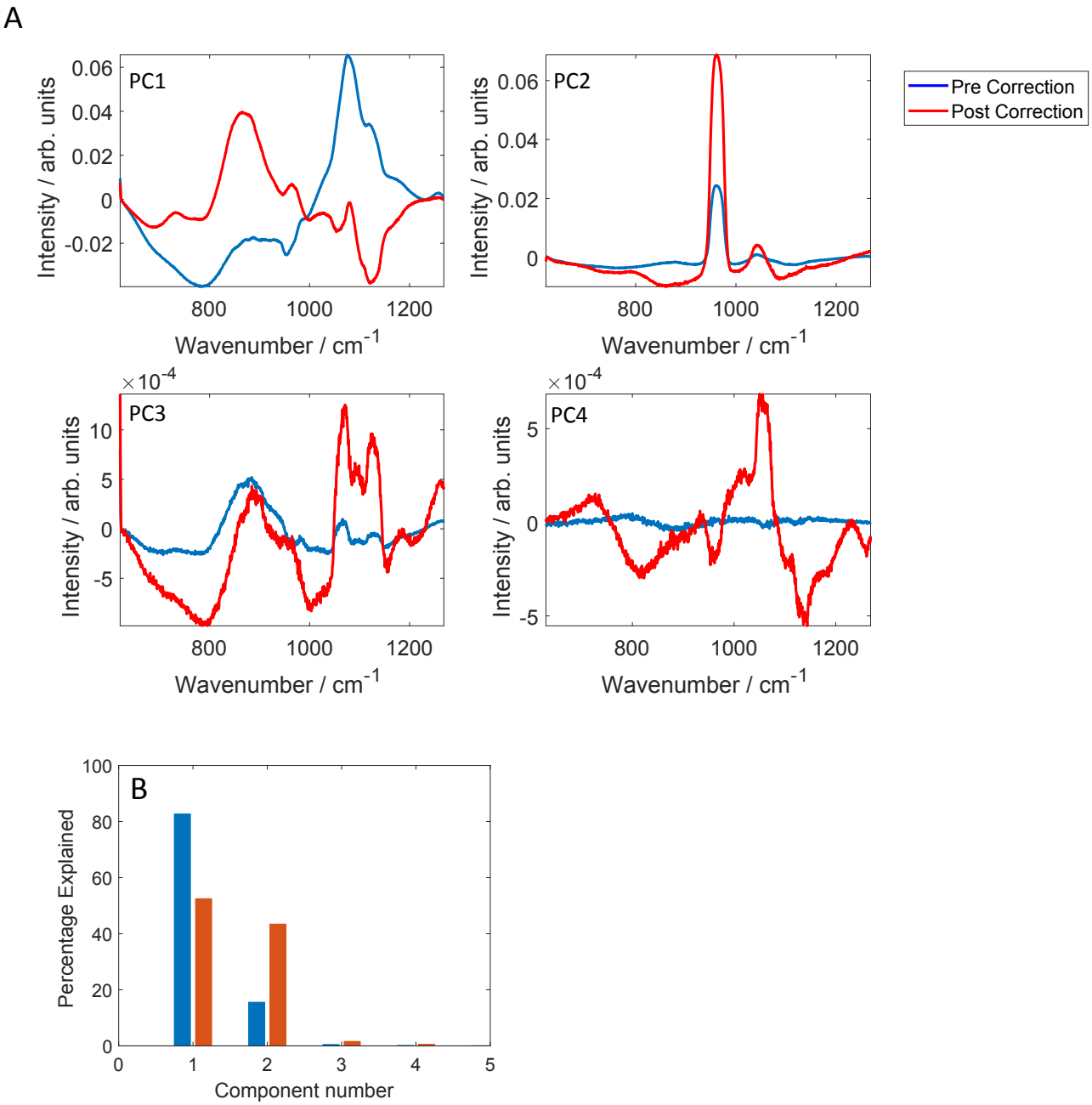

Figure S2| **A**, loadings comparison of PCs 1-4, of pre (blue) and post (red) corrected lard-hap phantom data were loadings are weighted to the variance explained. **B,** Comparison of percentage variance explained between corrected and uncorrected lard-HAP phantom.

The loadings of principal components (PCs) 1–4 represent decreasing variance explained of the data set. Most of the spectral variance is present in the first two PCs (98.6 and 96.2 %, respectively), as is shown (Figure 2B). Subsequent PCs explain an insignificant amount of information, especially if the 95% rule is followed. The subsequent PCs are shown for completeness, however statistically (as a contribution to the variance of the data) their contribution can be ignored. PC loadings represent both positive and negative variance in the spectra, those loadings showing negative values indicate that there is a reduction in the

amount of signal seen at that wavenumber, when there is higher PC score for this component within a spectrum. The first two PCs comprise the residual background variance (PC1) and the presence of HAP (PC2). In PC1 in the untreated data (blue), a broad feature is evident with both negative and positive features, indicating spectral change is occurring in opposite directions. The shape of this feature is caused by the background distortions due to the differential transmittance phenomena, that relatively increases or decreases spectral features depending on the transmission path, as described throughout the paper. Whereas for the corrected data in PC1 (red), there is a significant decrease in the original background distortion, thus reducing the relative intensity changes in the fat spectra, and normalising variance around the zero point. While for both PC2 relates to the HAP signal, with its prominence enhanced in the corrected data (red).