

SUPPLEMENTARY MATERIAL

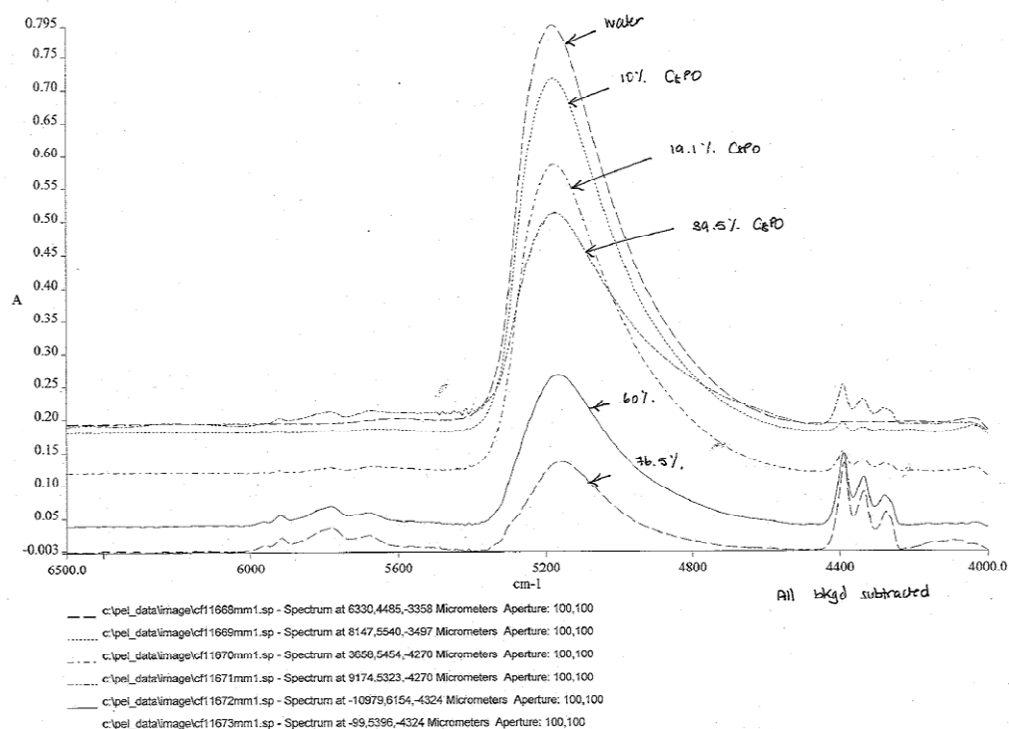


Figure S1: NIR spectra of the combination water band at $\sim 5180 \text{ cm}^{-1}$ for C₈PO with variable water contents 100, 90, 80.1, 60.5, 40 and 23.5 wt/wt% (top to bottom) performed at room temperature.

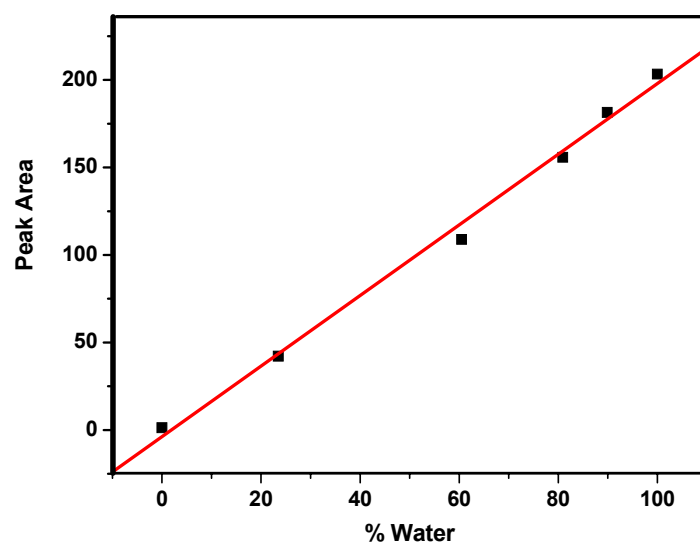
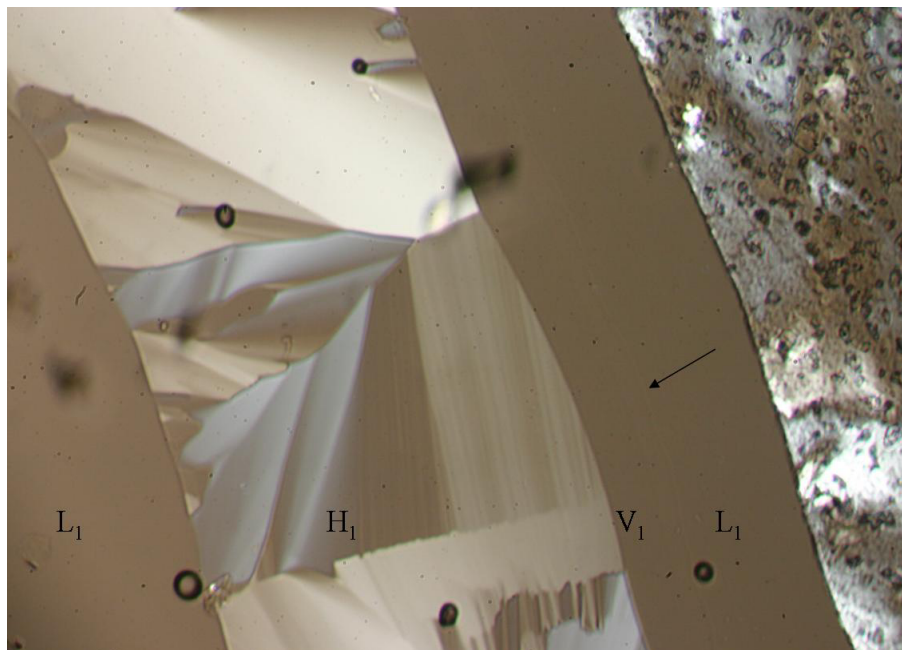
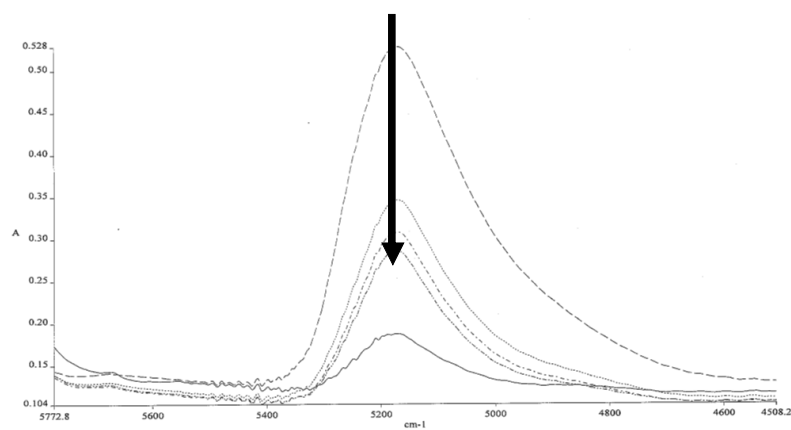


Figure S2: Representative calibration curve for DIT_NIR Microspectroscopy performed at 20°C using octyldimethylphosphine oxide (C_8PO). The calibration curves are linear with concentration demonstrating a Beer-Law dependency.

a



b



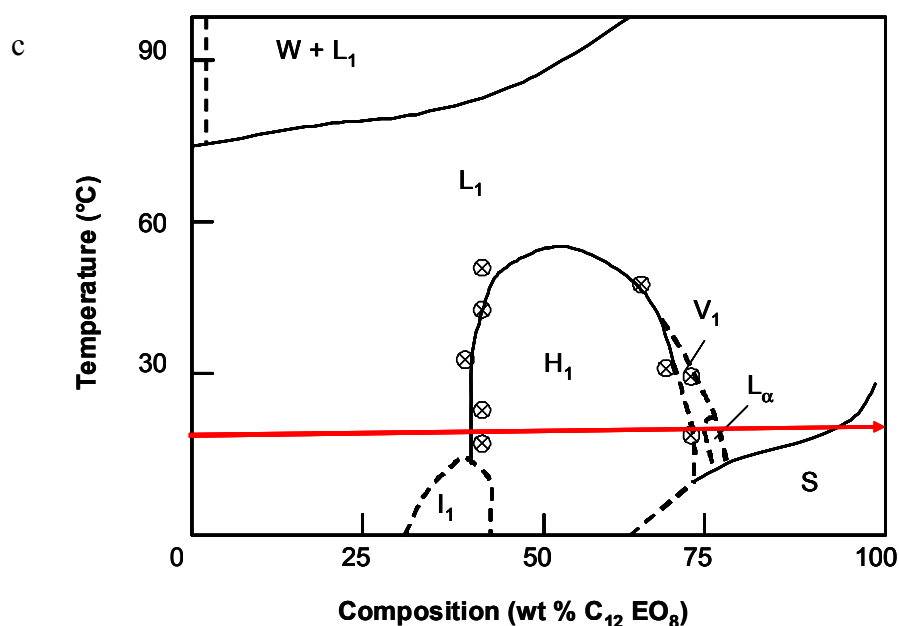


Figure S3: Validation of the DIT-NIR microspectroscopy method using $C_{12}EO_8$ a) penetration scan (non-cross polarised $\times 100$) showing the progression of phases at 20°C . The arrows indicated boundaries of bands with refractive index difference. b) NIR bend-stretch combination band at 5200 cm^{-1} showing the decrease in water signal from left to right across the phase boundaries. c) phase diagram of $C_{12}EO_8$ [re-drawn from Mitchell et. al {Mitchell , Tiddy, et al. 1983 #290}] with overlay of data collected from DIT-NIR showing reasonable correspondence.