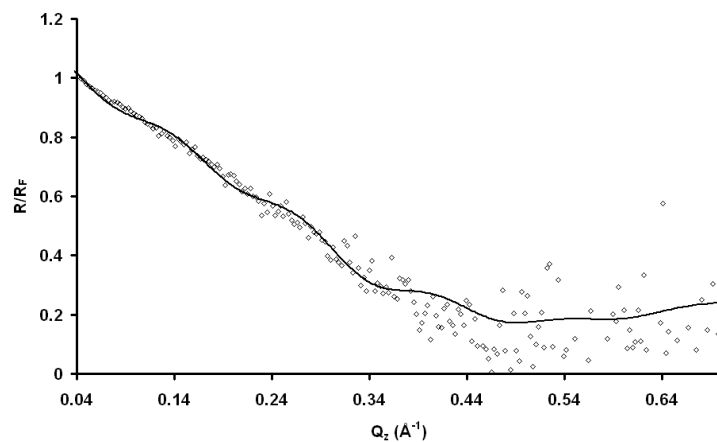## SUPPORTING INFORMATION

Figure 1: X-ray reflectivity profile (displayed as R/R_F vs Q_z) for the EtAN - air interface. The solid line represents the modeled x-ray reflectivity fit using the Chebyshev routine.
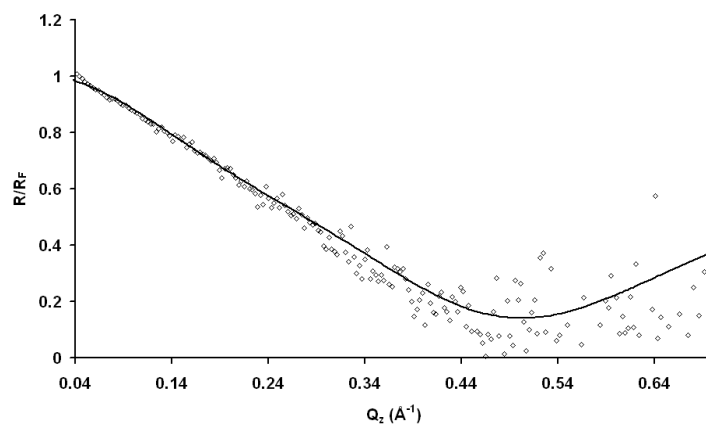

Figure 2: X-ray reflectivity profile (displayed as R/R_F vs Q_z) for the EtAN - air interface. The solid line represents the modeled x-ray reflectivity fit using the slices routine.
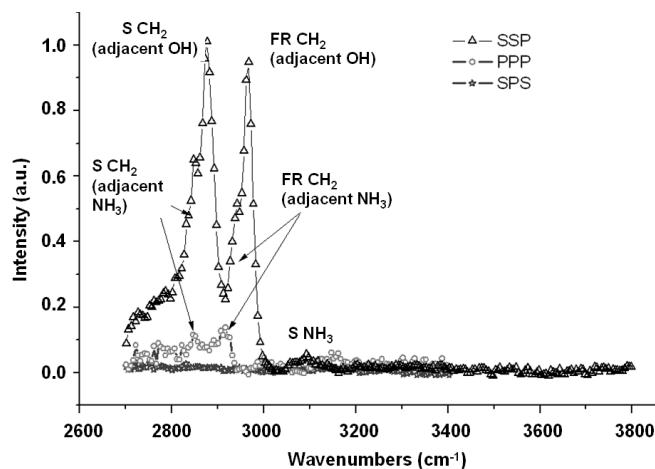
Figure 3: VSFS spectra for the SSP, PPP, and SPS polarisations of the EtAN – air interface in the CH, NH, and OH region.

Equation 1: Capillary wave roughness of a liquid surface

$$\sigma^2 = \frac{k_B T}{2\pi\gamma} \ln\left(\frac{q_{max}}{q_{min}}\right)$$

where k_B is Boltzmann's constant, T is the temperature, γ is the surface tension of the liquid, q_{max} = $(2\pi/D)$ and D is molecular diameter (0.54nm), and q_{min} = $(2\pi/\lambda)\Delta\beta\sin\theta$ and $\Delta\beta$ is the angular acceptance of the detector.