

Supporting Information Available.

Chemicals. Isopropyl amine ($\text{C}_3\text{H}_9\text{N}$) and propionyl chloride ($\text{C}_3\text{H}_5\text{ClO}$) were obtained from Acros (Geel, Belgium) and used without further purification. Deuterated water was purchased from Cambridge Isotope Laboratories Inc. (Andover, MA).

Synthesis. N-(isopropyl)propionamide (NiPPA) was synthesised by adding propionyl chloride (1 mole) to isopropyl amine (2 moles) in diethylether at 0°C under continuous stirring. The mixture was left stirring for approximately 15 min after the addition of all the propionyl chloride. After removal of amine hydrochloride by filtration, the residue was shaken with 20% aqueous NaOH to remove or decompose traces of acid, acid chloride, amine hydrochloride and amide hydrochloride. It was then dried with MgSO_4 to remove remaining H_2O . After removal of MgSO_4 , diethylether, used for washing MgSO_4 , was removed using a rotavap. The product was stored in a dessicator under reduced pressure to minimise the absorption of water. The chemical structure of NiPPA in deuterated chloroform was confirmed by ^1H NMR. The molar mass of the reaction product determined by mass spectrometry (KRATOS MS50TC) was 115.10 g/mole as expected. The melting point of the sample determined by DSC (Perkin Elmer DSC 7) was 49.51°C . A scanning rate of $5^\circ\text{C}/\text{min}$ was used and the onset of the peak was taken as the melting point.

Sample preparation. Homogeneous solutions of NiPPA in deuterated water were prepared by weighing appropriate amounts of NiPPA and adding appropriate volumes of deuterated water under nitrogen atmosphere. These mixtures were subsequently left at room temperature for 1 hour.

Fourier Transform Infrared Spectroscopy. Infrared spectra were measured using a Bruker IFS-66 Fourier transform IR spectrometer equipped with a liquid nitrogen cooled mercury cadmium telluride solid state detector. Dry air was used to continuously purge the sample

compartment. For each spectrum a total of 256 interferograms were co-added with a resolution of 2 cm^{-1} .

Temperature measurements were performed using a transmission cell with CaF_2 windows (Graseby Specac, Orpington, UK) separated by a Teflon spacer of $6\text{ }\mu\text{m}$ thickness. The cell was placed into a heating jacket which is controlled by a Graseby Specac automatic temperature controller. The temperature was increased at a rate of $0.2\text{ }^\circ\text{C/min}$.

Optical Microscopy. Phase transition temperatures were determined using an Olympus BH-2 light microscope with an ultralong working distance lens (20x). The samples were heated at a rate of $0.2\text{ }^\circ\text{C/min}$, using a Linkam hot stage for precise temperature control. To minimise any temperature difference between the heater and the sample, both the platinum resistor and the heater are enclosed within a high thermal conductivity silver block. The sample itself was placed directly upon a cover slip.

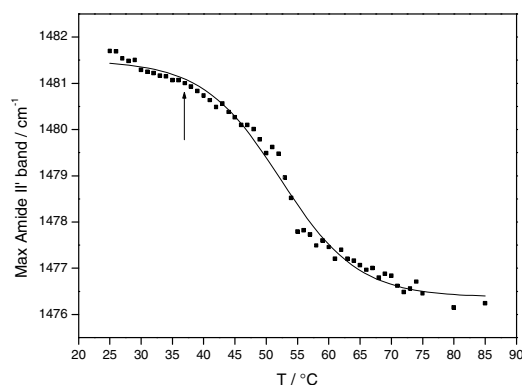


Figure S1. Plot of the amide II' band maximum of NiPPA in D_2O as a function of temperature ($w_2 = 0.3$).