

## **A Platform to Study the Hydrophobic Collapse of Thermoresponsive Polymer Poly(N-vinyl-caprolactam): A New Class of Biocompatible Solvents**

Pradeep Rawat<sup>1</sup>, Ritu Yadav<sup>1</sup>, Payal Narang<sup>1</sup>, Meena Bisht<sup>2</sup> and Pannuru Venkatesu\*<sup>1</sup>

<sup>1</sup>Department of Chemistry, University of Delhi, Delhi-110 007, India

<sup>2</sup>Department of Chemistry, Sri Venkateswara College, University of Delhi, Delhi-110 007, India.

### *Experimental methods*

*Steady State Fluorescence Experiments:* Fluorescence intensity measurements of the sample solutions are ascertained by using a Cary Eclipse fluorescence spectrofluorometer (Varian optical spectroscopy instruments, Mulgrave, Victoria, Australia) containing an intense xenon flash lamp as the light source. The emission spectra are recorded with a PMT voltage of 720 V and slit width of 10/10 nm. By mixing a fixed concentration of polymer (5 mg/mL) and increasing concentration of DESs from 50 to 200 mM, at a constant temperature of 25 °C, the ongoing interactions between DESs and PVCL are studied. The excitation wavelength is set at 360 nm and emission wavelength is collected at different wavelengths.

*Dynamic Light Scattering (DLS) measurements:* To assess the hydrodynamic diameter ( $d_H$ ) of PVCL in the presence of different concentrations of DESs, the Zetasizer Nano ZS90 dynamic light scattering (DLS) instrument (Malvern Instruments Ltd., UK) is used. The instrument is equipped with a fixed wavelength of 633 nm and 4 Mw He-Ne laser. A quartz sample cell containing 1.0 ml of a filtered sample is sealed with a Teflon-coated screw cap to protect from air and dust. The Brownian motions of particles are detected by DLS and correlated to the particle size. The data collected was analyzed using the Malvern Zetasizer software version 7.01

*Fourier Transform Infrared Spectroscopy (FTIR) measurements:* All the Fourier transform spectrum are acquired by an Is 50 FT-IR (Thermo-Fischer scientific) spectrometer. The two ZnSe windows and bubble free samples are placed into an IR cell. Inside the sample chamber, a chromel alumel K-type thermocouple was provided for monitoring of temperature. Each IR spectrum reported here is an average of 240 scans using a spectral resolution of 4  $\text{cm}^{-1}$ . Before the sample

spectra, a background spectrum is collected. Furthermore, for each sample containing PVCL, the deuterium oxide (D<sub>2</sub>O) spectrum was used as background.

*UV- visible Absorption Spectroscopy:* Absorption spectra of samples were scrutinized using a double beam UV-visible spectrophotometer (UV-1800), Shimadzu Co., Japan. Spectrophotometer possesses the highest resolution of 1 nm and has the wavelength accuracy of  $\pm 0.3$  nm. The spectra were recorded at room temperature in the wavelength range of 200- 600 nm using quartz cuvette of 1 cm path length.