Self-assembly amphiphilic polymer systems have been attracted for micelle and vesicle formations because of their amphiphilic nature and controlled structuring ability[1-4]. In this experiment, we were trying to understand the formation of polymeric micelles or vesicles with changing solvent environment for smart functional brush polymer systems with amphiphilic nature, especially, poly[oxy(11-phosphorylcholineundecyl-thiomethyl)ethylene -ran-oxy(n-dodecylthiomethyl)ethylene]s (PECH-PC), (Figure 1). PECH-PC had successfully been synthesized, and their thin film structure and biocompatibilities investigated [5-7]. We prepared samples as several compositions of solvent mixture (water : ethanol = 100:0, 80:20, 75:25, 50:50).

Figure 1: Chemical structures of smart functional brush polymers: PECH-PC.

The Micro- and Nanofocus X-ray Scattering (MINAXS) beamline of PETRA III was equipped 13 keV (wavelength : 0.94 Å) and sample to detector distance was prepared 8,000 mm and 1,500 mm. We used the PILATUS 1000K. Above the MINAXS specification, we did solvent X-ray scattering experiment.

Figure 2: (a) 1D SAXS pattern of PECH-PC100 micelle which sample to detector distance was 8,000 mm, (b) 1D SAXS pattern of PECH-PC100 micelle which sample to detector distance was 1,500 mm.
(black square = water 100 : ethanol 0, red circle = water 80 : ethanol 20, blue triangle = water 75 : ethanol 25, green triangle = water 50 : ethanol 50)

Through the Figure 2 data, we will analyze PHIC-PC micelle formation according to the solvent mixture. Moreover, we hope to investigate polymer micelle properties through the analysis of polymer micelle formation.

References