Supporting Information

Phase Transition and Aggregation Behaviour of an UCST- type Copolymer Poly(Acrylamide-co-Acrylonitrile) in Water: Effect of Acrylonitrile Content, Concentration in Solution, Copolymer Chain Length and Presence of Electrolyte Transition

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Synthesis of poly(AAm-co-AN):

\[
\begin{align*}
\text{NH}_2 - 
\text{O} & \quad \text{CN} \\
\text{TTC, ABDV, DMSO} & \quad 24 \text{ h, 55°C} \\
\end{align*}
\]

Fig. S1 Polymerization scheme of poly(AAm-co-AN) copolymers.

Table S1. Summary of the synthesis of poly(AAm-co-AN) copolymers with varying AN contents.

<table>
<thead>
<tr>
<th>Sample Name</th>
<th>Acrylamide [g]</th>
<th>Acrylonitrile [mL]</th>
<th>TTC [mg]</th>
<th>ABDV [mg]</th>
<th>Yield [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>4.75</td>
<td>0.48</td>
<td>60.0</td>
<td>4.0</td>
<td>67</td>
</tr>
<tr>
<td>P2</td>
<td>4.52</td>
<td>0.70</td>
<td>60.0</td>
<td>4.0</td>
<td>61</td>
</tr>
<tr>
<td>P3</td>
<td>4.30</td>
<td>0.90</td>
<td>60.0</td>
<td>4.0</td>
<td>59</td>
</tr>
<tr>
<td>P4</td>
<td>4.10</td>
<td>1.10</td>
<td>60.0</td>
<td>4.0</td>
<td>65</td>
</tr>
<tr>
<td>P5</td>
<td>3.96</td>
<td>1.21</td>
<td>60.0</td>
<td>4.0</td>
<td>63</td>
</tr>
<tr>
<td>P6</td>
<td>3.83</td>
<td>1.33</td>
<td>60.0</td>
<td>4.0</td>
<td>61</td>
</tr>
<tr>
<td>P7</td>
<td>3.59</td>
<td>1.56</td>
<td>60.0</td>
<td>4.0</td>
<td>60</td>
</tr>
</tbody>
</table>

Characterization of poly(AAm-co-AN):

Fig. S2 $^1\text{H}$-NMR spectrum (400 MHz, DMSO-d$_6$) of poly(AAm-co-AN) (sample P4, $F_{AN}$=0.144).
Fig. S3 GPC traces of poly(AAm-co-AN).

Fig. S4 ATR-FTIR spectrum of poly(AAm-co-AN) with acrylonitrile feed content of 0.225 % (Sample P4, $F_{AN} = 0.144$).

Fig. S5 Calibration curve used for the determination of the copolymer compositions of poly(AAm-co-AN). Standard homopolymer of polyacrylamide and polyacrylonitrile were thoroughly mixed. For the calibration, the carbonyl (C=O) peak from the copolymer at wavelength 1655 cm$^{-1}$ and nitrile peak (CΞN) from acrylonitrile group at wavelength 2240 cm$^{-1}$ were compared. The ratio between them is plotted against acrylonitrile content.
Fig. S6 First derivative of the $R_h$ against temperature ($T$) curve in the heating and cooling cycle with concentration of 5 mg/mL (sample P4, $F_{AN}=0.144$).

Fig. S7 Determination of refractive index increment ($dn/dc$) of poly(AAm-co-AN) copolymer ($F_{AN} = 0.144$) using dn/dc 2010 instrument (PSS, Germany).