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## Small-Angle X-Ray Scattering Study of Phase Behavior in Alternating Amphiphilic Copolymers (CnEGm) in Water

The self-assembly of amphiphilic copolymers comprising alternating hydrophobic and hydrophilic blocks has attracted considerable attention lately owing to their ability to form diverse nanostructures such as micelles, vesicles, and gels. This study focuses on the investigation of the phase behavior of in-house synthesized amphiphilic copolymers with alternating hydrophobic and hydrophilic blocks, known as CnEGm, in water using small-angle X-ray scattering (SAXS). The study reveals that the phase behavior of these copolymers is influenced by various factors, including the length of the hydrophobic and hydrophilic blocks, as well as the molecular weight of the polymer (Figure 1a). The results also demonstrate that the external parameters such as temperature and concentration can be manipulated to control the phase behavior of these copolymers. Notably, the study reports the formation of a highly ordered gel structure (Figure 1b), which has not been observed previously, emphasizing the significance of exploring the structure of this polymer for its potential applications.

**Primary authors:** SHARMA, Tulika; BIEHL, Ralf; KRUTEVA, Margarita; Dr DULLE, Martin (JCNS-1. Forschungszentrum Juelich); ALLGAIER, Jürgen (JCNS); FÖRSTER, Stephan (Forschungszentrum Jülich)

**Presenter:** SHARMA, Tulika

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