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NMR studies of model amphiphilic polymer co-networks

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Owing to the possibility of environment-dependent property tuning, amphiphilic polymer co-networks (APCNs) have been attracting attention in recent years as possible functional materials, e.g. as media for selective transport. In order to understand the underlying mechanism of such properties, systematic studies on model systems are needed. We use well-established NMR methods to study tetra-arm PEG-PCL APCNs and their PEG-PEG analogues. These APCNs were previously shown to have near-model properties with very low inelastic defects, almost complete conversion, high fraction of ideal single links and nanoscale phase separation in selective solvents [1,2]. In this work, multiple-quantum NMR (MQNMR) is used to determine the connectivity motifs of networks with novel crosslinking chemistry aimed to improve the model nature of the APCNs. In addition, MQNMR is also used to understand the chain order in networks at isotropic as well as anisotropic swelling conditions. Pulsed field gradient NMR is used to study the diffusion of a model protein (lysozyme) in the network matrix.

Literature:

[1] C. Bunk *et al.* *Macromolecules* **2022**, 55(15), 6573-6589.

[2] L. Löser *et al.* *Macromolecules* **2024**, 57(3), 940-954.