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High Pressure GISANS for soft matter systems: case study on polymer brush mixtures

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Tuning hydrostatic pressure up to moderate (P < 1000 bar) pressure values can be crucial for understanding structure-property interplay in different disciplines, including: protein treatment in food processing, biophysics of deep-sea, processing of baroplastic polymers, polymer coating technologies for artificial joints. To the best of our knowledge, the role of pressure and thermodynamic mismatch on (1) the nanostructure of more complex brush topologies such as binary brushes and on (2) the lateral morphological characteristics of such layers in the size range 1-200 nm has so far remained elusive. We present results of high pressure Grazing Incidence Small Angle Neutron Scattering (high-P GISANS) and off-specular scattering from Neutron Reflectometry acquired at the ILL, underlining the nanoscale lateral and vertical morphologies of weakly and strongly segregated brush homopolymer mixtures under crowded conditions and confinement.

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