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Secondary Structure-Induced Micro- and Macro-Phase Separation in Polypeptide Diblock, Triblock and Star-Block Copolymers ANTONI SANCHEZ-FERRER, RAFFAELE MEZZENGA, ETH Zurich, FOOD & SOFT MATERIALS SCIENCE TEAM — Self-organized polypeptide block copolymers are of great interest due to their potential uses as materials for nano-devices and bio-engineering. In order to explore the effect of block copolymer topologies on their structures, a series of di-, tri- and tetra-block copolymers has been synthesized. A coil-like soft block based on poly(propylene oxide) chemistry was chosen due to its low glass transition temperature, amorphous nature and immiscibility with biological systems. On the other hand, rod-like block polypeptide based on poly(*L*-glutamic acid γ-benzyl ester) was selected and grown from the coil soft macroinitiator by ring opening polymerization. Because of the mono-, bi-, or tri-functionality of the coiled blocks, linear di-block, tri-block and star-like tetra-block copolymers could be successfully synthesized. The resulting materials show micro-phase separated liquid-crystalline morphologies, in which the architecture or connectivity of the blocks, the molecular weight of the coil segment, the volume fraction and the secondary structure of the polypeptide blocks all contribute to their micro-phase separated features. These materials can be seen as model reference systems towards the design of biocompatible scaffolds and artificial muscles.

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