From Supramolecular Nanostructures To Life-Like Systems

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Peptide nanostructures are ubiquitous in Nature and they have been extensively studied, as they mimic the fibrous part of the extracellular matrix formed by proteins such as collagen. Moreover, they support the survival and growth of cells when applied as coatings or 3D matrices. We have designed peptide sequences that assemble into ordered peptide nanostructures capable of capturing virions and attaching to cellular membranes. The self-assembling peptides have been sequence-optimized to achieve efficient gene transduction and certain sequences also stimulated neuronal cell growth in a nerve regeneration in vivo model.

Peptide nanostructures can also be formed inside living cells by multi-step chemical reactions occurring in different cellular compartments. The formation of synthetic nanostructures inside the cytosol of cancer cells affects cell viability. Controlling cellular death (apoptosis) upon structure formation opens new opportunities for applications in oncology.

Related publications

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3. Chen, C.; Wunderlich, K.; Mukherji, D.; Koynov, K.; Heck, A. J.; Raabe, M.; Barz, M.; Fytas, G.; Kremer, K.; Ng, D. Y. W.; Weil, T. Precision Anisotropic Brush Polymers by Sequence Controlled Chemistry. *Journal of the American Chemical Society* **2020**, *142* (3) 1332–1340 doi.org/10.1021/jacs.9b10491.
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