

Single-Chain Nanotechnology: Current Status and Opportunities

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The recent ability to manipulate and visualize single atoms at atomic level has given rise to modern bottom-up nanotechnology. Similar exquisite degree of control at the individual polymeric chain level for producing functional soft nanoentities is expected to become a reality in the next few years through the full development of so-called “single chain nanotechnology”. Ultra-small unimolecular soft nano-objects endowed with useful, autonomous and smart functions are the expected, long-term valuable output of single-chain nanotechnology.

This keynote lecture focus on the recent advances in single-chain nanotechnology for the construction of soft nano-objects via chain compaction, with special emphasis in single-chain nanoparticles (SCNPs). [1] SCNP formation is reminiscent of protein folding and depending on the synthesis route and the amphiphilic nature of the SCNP precursor two limiting SCNP molecular architectures result: *Type I*-SCNPs with multiple “local pockets”, and *Type II*-SCNPs with a single pocket of larger size. The possibility to anchor, either temporally or permanently, active species like drugs or catalysts onto these local pockets paves the way to the use of SCNPs in a variety of nanomedicine and catalysis applications.

References

- [1] *Single-Chain Polymer Nanoparticles*. J. A. Pomposo (Editor), Wiley-VCH, Weinheim, 2017.

Figures

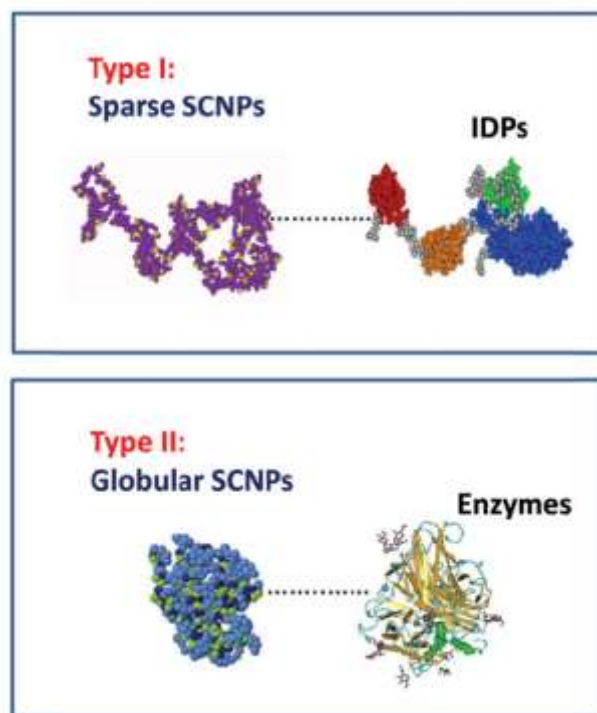


Figure 1: Morphologies of single-chain nanoparticles (SCNPs).

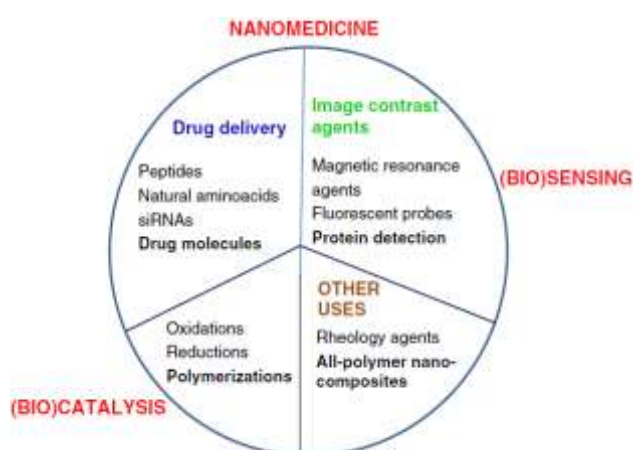


Figure 2: Application areas for SCNPs.