Structure and Dynamics of Single-Chain Nano-Particles in Solution

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Single-Chain Nano-Particles (SCNPs) obtained by intra-molecular cross-linking of linear macromolecules are emerging soft nano-objects showing unique and remarkable physicochemical, rheological, and sensing properties as a result of their locally collapsed structure and ultrasmall size. Here we present our recent investigations on the properties of SCNPs in solution and how they develop upon crowding their environment. The small angle scattering and neutron spin echo results obtained on real systems are interpreted in the light of coarse-grained molecular dynamics simulations. Regarding the structure, contrarily to the a priori assumed globular conformation, in dilute solution SCNPs adopt sparse morphologies [1]. Crowding induces compaction of the SCNPs reflected in a decrease of the chain dimensions and the scaling exponent [2]. Conversely, the dynamic structure factor reveals a large impact of internal crosslink on the macromolecular mobility [3]. We conclude that both, structurally and dynamically, SCNPs show striking resemblances with intrinsically disordered proteins: similar scaling properties and an extremely high internal friction.

¹ J. A. Pomposo et al, *ACS Macro Lett.* **3**, 767 (2014)

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