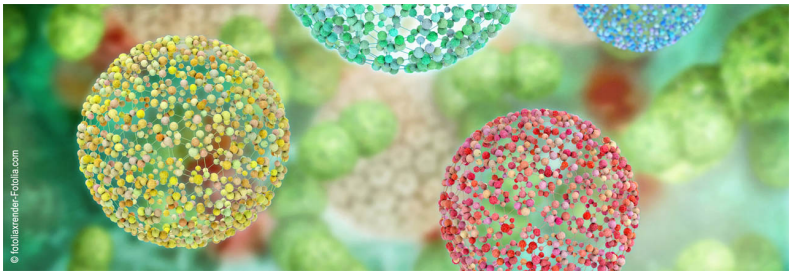

Contribution ID: **39** Type: **Poster**

Long Term-Dispersible and Metal-Free Single-Chain Nanoparticles (SCNPs)

Single chain nanoparticles (SCNPs) are soft nano-objects formed by individual polymeric chains collapsed/folded via intra-chain interactions. In the last decade, a great variety of SCNPs with promising properties have been developed for a wide range of applications such as biomedicine or catalysis. Several synthetic pathways have been reported to prepare these SCNPs using polymers as precursors, which present functional groups able to promote the collapse of the polymeric chains. Particularly, Cu(I)-catalyzed azide–alkyne cycloaddition (CuAAC) is one of the most used methods for preparing SCNPs. It is well known that SCNPs synthesized via CuAAC often experience metal-induced aggregation issues during storage. Moreover, the presence of metal traces limits its use in a number of applications. To address this problem, a new platform towards stable, inert, dispersible, metal-free SCNPs via intramolecular metal-traceless azide–alkyne click chemistry have been developed. In this project, a bifunctional cross-linker molecule, sym-dibenzo-1,5-cyclooctadiene-3,7-diyne (DIBOD) has been selected. DIBOD has two highly strained alkyne bonds that allow for the synthesis of metal- free SCNPs. To demonstrate the utility of this new approach, metal-free polystyrene (PS)-SCNPs have been synthesized, without significant aggregation issues during storage. The insignificant aggregation of (PS)-SCNPs were demonstrated by small-angle X-ray scattering (SAXS) experiments. Remarkably, this method opens the way for the synthesis of long-term-dispersible, metal-free SCNPs from potentially any polymer precursor decorated with azide functional groups.

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Session Classification: Poster Session & Discussion with Wine and Cheese