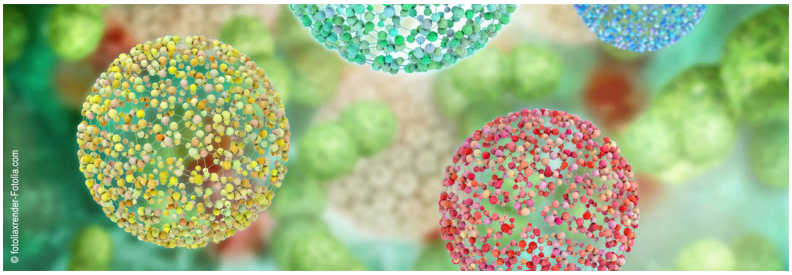

Contribution ID: **21** Type: **Poster**

Influence of the preparation process on the characteristics of self-assembled supramolecular Janus nanocylinders

Janus particles are asymmetric nanoparticles with two faces of different compositions and features. This makes them relevant for applications as sensors, in two-color display panels, in catalysis or as emulsion stabilizers.1 Janus nanocylinders (JNR) are very difficult to prepare due to their nanometric dimensions and anisotropic character, but this simultaneously makes them very relevant for applications where high surface areas and high aspect ratios are needed. The only two methods reported prior to our work to prepare JNR rely on self-assembly of copolymers bearing strongly incompatible arms. A recent method which does not rely on polymer arm incompatibility has been reported in our team.2,3 Han et al. 3 has promoted a Janus character by self-assembling two polymers end-functionalized with non-symmetrical, complementary hydrogen bonding stickers. JNR were obtained by pre-dissolving the building blocks as unimers in DMSO before slowly adding water to trigger co-assembly. It has been established that the co-assembly into nanorods was kinetically controlled in aqueous medium, suggesting a process-dependent character on the structure of the assemblies. Therefore, here we have decided to focus our work on understanding the key steps of the assembly in order to control the diameter and length of the JNR. To this end, the role of temperature, rate of water addition,4 water to DMSO ratio, or concentration of polymer on the characteristics of the self-assembled JNR was investigated. One of the key results of this study is that the co-assembly into JNRs happens at very low water contents and that once the JNRs are formed, the system is kinetically frozen (unable to reorganize) and therefore very robust.

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Session Classification: Poster Session & Discussion with Wine and Cheese