Long-Range Ordering of Highly Charged Self-Assembled Nanofilaments

Liam C. Palmer, Cheuk-Yui Leung, Sumit Kewalramani, Rohan Kumthekar, Christina J. Newcomb, Monica Olvera de la Cruz, Michael J. Bedzyk, Samuel I. Stupp

Charged nanoscale filaments are well-known in natural systems such as filamentous viruses and the cellular cytoskeleton. The unique properties of these structures have inspired the design of self-assembled nanofibers for applications in regenerative medicine, drug delivery, and catalysis, among others. We report here on an amphiphile of completely different chemistry based on azobenzene and a quaternary ammonium bromide headgroup that self-assembles into highly charged nanofibers in water and orders into two-dimensional crystals.

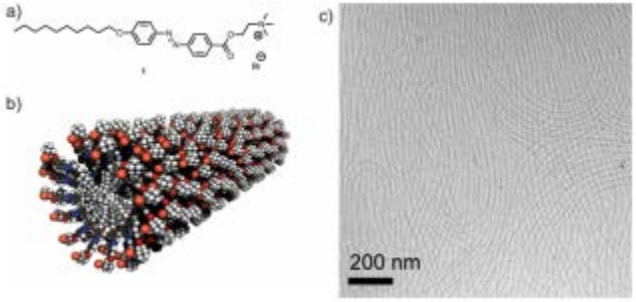

Figure 1. (a) Molecular structure of amphiphile 1 and schematic representation of self-assembled nanofiber. (b) Representative cryogenic TEM images of nanofibers formed by self-assembly of cation 1 (1 mM in water).

Liam C. Palmer, Cheuk-Yui Leung, Sumit Kewalramani, Rohan Kumthekar, Christina J. Newcomb, Monica Olvera de la Cruz, Michael J. Bedzyk, Samuel I. Stupp “Long-Range Ordering of Highly Charged Self-Assembled Nanofilaments” J. Am. Chem. Soc. 136, 14377-14380 (2014).

Department of Energy (DOE), Office of Basic Energy Sciences under award no. DESC0000989. S.K. was funded by AFOSR (FA9550-11-1-0275).