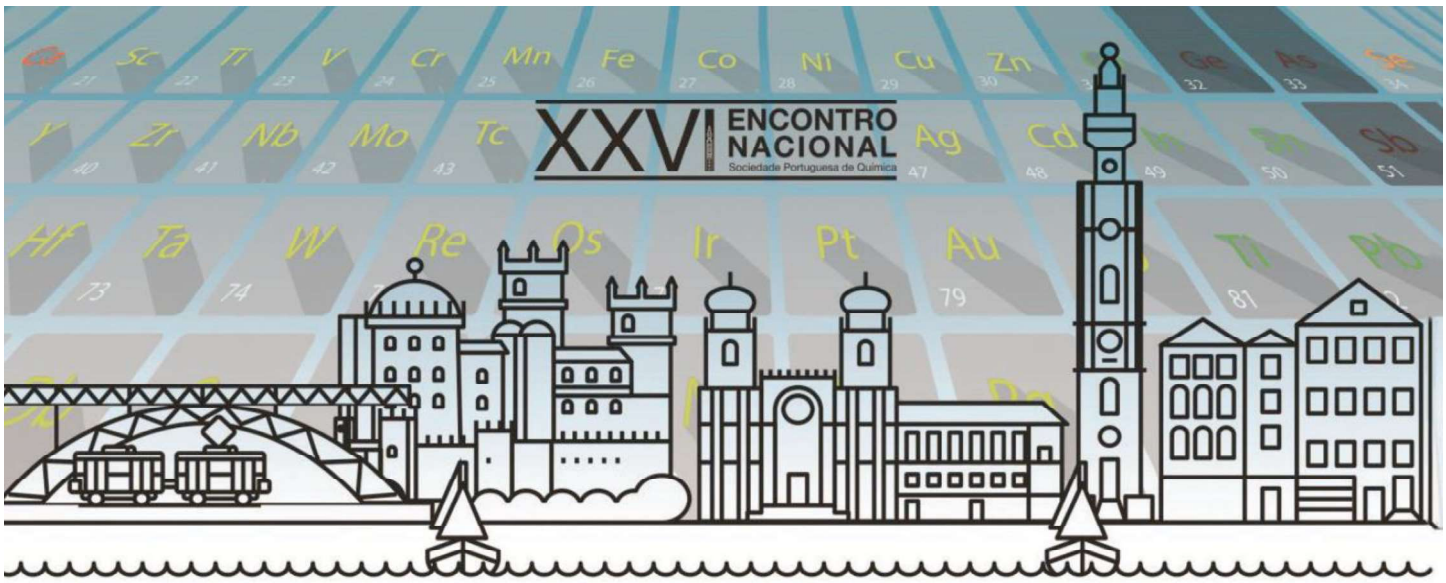

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Nanotechnology

Stimuli-sensitive self-assembled tubules based on lysine-derived surfactants as nanocarriers for proteins

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Drug delivery vectors based on amphiphilic molecules present considerable advantages, namely versatility in physicochemical properties and sensitivity to stimuli. Amino acid-based surfactants, in particular, are rather promising amphiphiles for this purpose[1] because of their enhanced biocompatibility compared to conventional surfactants. In addition to forming micelles and vesicles, they can self-organize into other complex supramolecular structures, such as fibers, twisted ribbons, helical tapes and nanotubes.[2,3]

Herein, we have studied a family of novel anionic double-chained lysine-based surfactants, with variable degree of chain length mismatch. Because of their peculiar structure, these compounds are able to form in water tubular structures with assorted morphologies, as evidenced by video-enhanced light microscopy (VELM), scanning electron microscopy (SEM and cryo-SEM), cryogenic transmission electron microscopy (cryo-TEM) and atomic force microscopy (AFM).[3] The loading ability of the tubules towards lysozyme, under varying experimental conditions, has been investigated *inter alia* by differential scanning microcalorimetry, gel electrophoresis and UV/VIS spectroscopy, with the goal of assessing the efficiency of these aggregates as pH- and temperature-sensitive nanocarriers for a model biomolecule. Results on the stability of the native and loaded tubules when in contact with different fluids (serum, artificial saliva, artificial sweat, blood), and on their toxicity in human cells, are also presented and discussed.

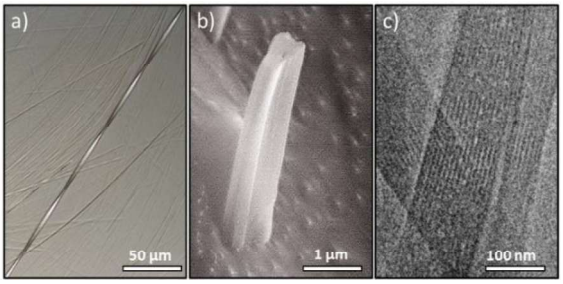

Figure 1: Tubular nanostructures of 8Lys16 in water (0.5% w/w) as observed by: a) VELM, b) cryo-SEM, c) cryo-TEM.

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References:

1. Silva, S. G.; Oliveira, I. S.; do Vale, M. L.; Marques, E. F. *Soft Matter* **2014**, *10*, 9352.
2. a) Shimizu, T.; Masuda, M.; Minamikawa, H. *Chem. Rev.*, **2005**, *105*, 1401. b) Brito, R.; Oliveira, I. S.; Araújo, M. J.; Marques, E. F. *J. Phys. Chem. B*, **2013**, *117*, 9400.
3. Oliveira, I. S.; Lo, M.; Araújo, M. J.; Marques, E. F. *Soft Matter*, **2019**, *15*, 3700.