Chimia 56 (2002) 20

ISSN 0009–4293

Polymer Nanocontainers

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Ruzicka Prize Winner 2001

Abstract: In recent years nanostructured materials have attracted increasing economical and scientific interest. The idea is to create new properties and new applications with well-known standard materials by controlling their size and morphology at the nanometer-size level. In this context polymer nanocontainers have proven to be particularly interesting. The preparation of nanometer-sized containers that are both biocompatible and stable is, however, a very challenging task. The most promising materials in this respect are amphiphilic block copolymers that can be easily designed to mimic biological membranes. Similar to conventional lipids, appropriate amphiphilic block copolymers may also self-assemble in aqueous media to vesicular structures that can be stabilized by polymerization. The long-term stability of these structures makes them well adapted for applications and guarantees a constant nonchanging environment for embedded therapeutic or analytic molecules and promise interesting applications in pharmacy or biotechnology. Particularly since the permeability of such nanocontainers can be controlled by attaching stimuli-sensitive (*i.e.* pH, temperature, specific molecules,…) groups to their surface or by inserting specific channel proteins into their shells. Furthermore, surface-bound ligands or reconstituted membrane proteins makes them suitable for molecular recognition.

Keywords: Amphiphilic block copolymers · Membrane proteins · Polymer nanostructures · Self assembly

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