Metal Proteins in Self-assembling Copolimer Nanovesicles: New Hybrid Materials

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One of the most powerful approaches in obtaining well-defined scaffolds for three-dimensional (3D) cell culture, DNA-based structures and metal nanostructured materials is the bottom-up design using self-assembly mechanisms. In this way the molecular building blocks undergo spontaneous organization into well-defined and stable nanostructure morphologies (colloidal size particles, core-shell micelles, nanotubes, etc). The presence of metals in these systems changes dramatically their physical and chemical properties leading to composite materials with new behavior and therefore larger technological applications. In this study we are proposing new hybrid materials based on encapsulation of metal proteins in self-assembling copolymer nanovesicles, or reconstitution of membrane proteins in the membrane of the vesicles. Polymeric nanocontainers of PDMS-PMOXA-PDMS produced by self-assembly of amphiphilic block copolymers offer a better way to the liposome carriers, more stable, while preserving all the other advantages of lipidic systems, such as lack of immunogenicity. Due to the mild way to reconstitute the proteins in the membrane or the inner space of the nanovesicles, they preserved their structure and activity, as established by various spectroscopic and biochemical methods.