DEVELOPMENT OF NOVEL NANOBIOMATERIALS BASED ON VIRAL PROTEINS

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Introduction.

Viral proteins have the capacity of self-assembling into structures with nanometric dimensions. The characteristics of viral proteins, such as specific host cell recognition and polymorphism, can be exploited to design novel nanobiomaterials with unique properties. In our group, we have enriched such properties by providing additional functionalities to the viral properties by conjugating them with metals and other elements[1,2]. In this way, nanobiomaterials with diverse applications, such as catalysts, conductors, biosensors, delivery agents, can be obtained. In this talk, our recent work on novel nanobiomaterial development will be presented.

Methods.

Recombinant proteins and recombinant baculovirus (BV) were produced in the insect cell-baculovirus expression vector system. Recombinant proteins from rotavirus (VP2, VP6 and VP7) were purified and used to construct the nanomaterials as previously described[3,4].

Results.

Nanomaterials with a wide variety of characteristics have been synthesized. Our previous work has shown that VP6 nanotubes can be functionalized in their external surface with metal nanoparticles[1]. Recently, strategies for synthesizing silver nanowires in the inner surface of VP6 nanotubes have been developed[2] (Fig. 1). Other types of nanomaterials that have been constructed will be presented, including nanomaterials based on complete viruses. Moreover, approaches to manipulate the extent and type of functionalization of viral proteins will be presented.

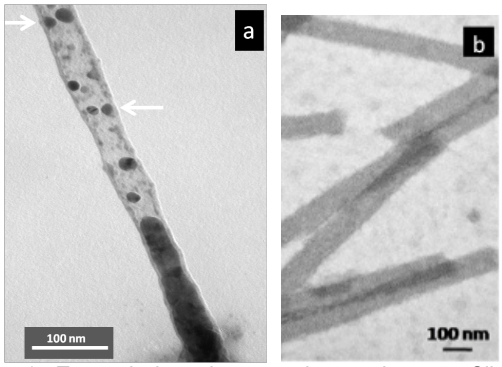

Fig 1. Transmission electron micrographs. a. Silver nanowire synthesized in the inner lumen of a VP6 nanotube[2]. Arrows show silver nanoparticles forming inside the tube. b. VP6 nanotube stained with uranyl acetate[3].

Conclusions.

Viral proteins have demonstrated to be versatile and useful tools for the design of novel nanobiomaterials with unique properties.

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