Hybrid Organosilica for Smart Drug Delivery System

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The global market of nanomedicine and vectorization is predicted to be worth 225 billion dollars in 2017; and so far is dominated with the use of polymeric based materials. As an alternative, silica based nanomaterial is promising candidate for future development in this field due to its advantage. In particular, the appealing multifunctionality that can be built around this system.

In this poster, the functional systems created using inert or active inorganic nanocontainers such as microporous and mesoporous silica based nanoparticles will be presented. In particular, examples using the crystalline allumino silicates, zeolite L, will be discussed since these materials can act as nanocontainers and due to their biocompatibility used for biomedical applications. However, as many nanoparticles, they are not biodegradable. Recently, we developed hybrid organosilica system by incorporating physiologically responsive functional groups in the framework. Following this approach, it is possible to design a drug delivery platform, which able to break apart after reaching the target cell. Not only for small drugs, using slightly different strategy, we are able to deliver bigger size bioactive molecules such as oligonucleotide, protein, and enzymes. Furthermore, after release the cargo payload, we could expect the remaining materials leave the cells and eventually the body in the case of in vivo delivery.

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