HYBRID NANOPARTICLES FOR BIOMEDICAL APPLICATIONS

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Advancements in the use of nanoparticles for biomedical applications have clearly shown their potential for the preparation of improved imaging and drug-delivery systems. However, only a few successfully translate into clinical practice, because, a common "barrier" preventing nanoparticles from delivering efficiently their payload to the target site after administration, is related to the nanoparticle uptake by macrophages. In my contribution the rationale to design and synthesize nanoparticles will be discussed as well as the problems to reach humans in the clinical trials. Some examples illustrating the difficulties to control the degradation rates, the efficient loading and the lack of targeting ability will be discussed. The size and morphology of the nanoparticles determine not only their biodistribution but also their capacity to escape macrophages. Finally some novel applications of nanomaterials in order to the capture and not release of specific biomarkers will be discussed. In particular combining dyes and the porosity of zeolites a novel class of fluorescent artificial receptors (FARs) has been reported. These FARs can bind the neurotransmitters serotonin and dopamine in a bio-relevant concentration range with unprecedented affinity and selectivity.

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