学术报告

题 目: Renal Clearable Luminescent Metal Nanoparticles: A New Frontier of Cancer Nanotechnology

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固体表面物理化学国家重点实验室
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Renal Clearable Luminescent Metal Nanoparticles: A New Frontier of Cancer Nanotechnology

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While inorganic nanoparticles with size-dependent material properties open up unprecedented opportunities for novel biomedical technologies, translation of these nanoparticles into clinical practices has been hampered by the potential toxicity resulted from their long-term nonspecific accumulation in healthy tissues. Emergence of renal clearable inorganic nanoparticles makes it possible to address this long-term challenge. In this talk, I will discuss how to use glutathione, a tri-amino-acid peptide to stable 2~3nm gold nanoparticles, which can give different colored luminescence upon their valence states of gold atoms [1]. These glutathione coated gold nanoparticles (GS-AuNPs) have little interactions with serum proteins; and more impressively, they can be cleared from the body through kidneys with an efficiency of 10~100 times better than the same sized AuNPs [2] and exhibit unique molecular-like pharmacokinetics [3]. By further modifying the surface chemistry, we found that these NPs can be successfully tuned to avidly target cancer cell membrane under mild acidic conditions (6.5 –5.3) even in the presence of serum proteins [4]. More recently, we found that they can passively target the MCF-7 breast cancer through enhanced permeability and retention (EPR) effect [5], which can be further enhanced through PEGylation [6]. This new class of renal clearable AuNPs holds great promise to address challenges in cancer imaging and therapy [7]. Finally, some material-chemistry challenges in the development of renal clearable inorganic nanoparticles are also discussed.

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