Inspired by Nature: Separation of Lanthanides and Actinides

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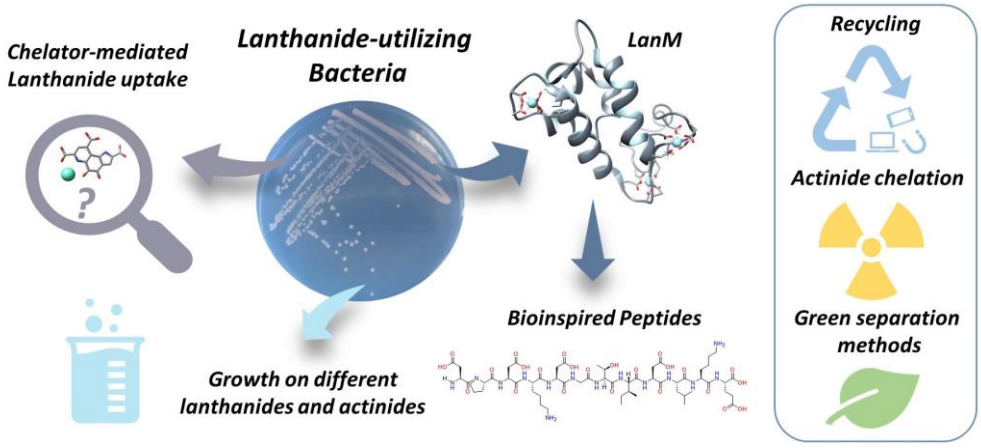
Lanthanides (Ln) are essential ingredients sprinkled in a multitude of applications in our daily life, especially important for sustainable and clean energy applications. However, owing to their chemical similarity, separation of Ln is tedious. In the past decade, the role of Ln for many methylotrophic bacteria has been firmly established, and bacteria that take up Ln and use them in the active sites of quinone-dependent alcohol dehydrogenases have been extensively studied. From these bacteria, proteins and small chelators that have remarkable selectivity and affinity for lanthanides have been identified.[1-4] One such protein is lanmodulin (LanM).[3] LanM has high affinity for both Ln and actinides such as americium and curium.[4,5] In our efforts to understand the high affinity and selectivity, we compared LanM to synthesized small peptides based on the EF-hand binding sites in this protein and studied the coordination behavior using Circular Dichroism and Time-resolved Laser-induced Fluorescence Spectroscopy.[4,5] This talk will give an overview into bioinspired Ln and actinide separation methods using bacteria, their Ln-binding proteins or bioinspired small chelators, respectively.



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