



UNIVERSITÀ  
DEGLI STUDI DI TRIESTE

Dipartimento di Scienze Chimiche e Farmaceutiche

## AVVISO DI SEMINARIO

### “Cucurbituril-Based Functional Materials”

#### Prof. Kimoon Kim

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**Aula A1, Edificio C11, III piano**

**Abstract:** Cucurbit[ $n$ ]uril (CB[ $n$ ],  $n = 5 - 10$ ),<sup>1</sup> a family of host molecules comprising  $n$  glycoluril units, have a hydrophobic cavity and two identical carbonyl-laced portals, which allow them to form stable inclusion complexes with a wide variety of guest molecules. For example, CB[7] forms very stable host-guest complexes with ferrocenemethylammonium (FA) ions in water with a binding constant up to  $10^{15} \text{ M}^{-1}$ .<sup>2</sup> It is one of the highest binding affinity ever observed in synthetic receptors and quite close to that of the biotin-avidin pair ( $10^{13} - 10^{15}$ ). Our discovery of a direct functionalization method of CB[ $n$ ] allowed us to synthesis a wide variety of tailor-made CB[ $n$ ] derivatives and explore new applications of the host family.<sup>3</sup> For example, lipophilic alkylated CB[ $n$ ] ( $n = 5, 6$ ) behaves as an ion channel when embedded in a lipid bilayer.<sup>4</sup> Amphiphilic CB[6] derivatives form vesicles whose surface can be easily modified by host-guest interactions,<sup>5a</sup> which may be useful in targeted drug delivery.<sup>5b</sup> We recently synthesized polymer nanocapsules via polymerization of allyloxyCB[6] which has a rigid core and multiple polymerizable allyl groups at the periphery.<sup>6</sup> Without needs for any pre-organized structures or templates, and core-removal the reaction directly produces polymer nanocapsules with a stable structure and narrow size distribution. The polymer shell made of host molecules allows tailoring of the surface properties by host-guest interactions. The easy synthesis and unique ability to tailor surface properties in a noncovalent manner make the polymer capsules and vesicles potentially useful in many applications including targeted drug delivery.<sup>6a,6b</sup> We also reported a novel noncovalent method to immobilize a protein on a solid surface using the CB[7]-FA pair,<sup>7a</sup> which may serve as a replacement of the avidin-biotin system for this and other applications.<sup>7b</sup> Some of our recent work will be presented.

Il Direttore del DSCF  
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