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New multivalent scaffolds for anions sequestration

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Abstract:

Anions and cations are ubiquitous in nature and play very important roles in many areas, such as biological research, clinical diagnosis, industries and environmental process. Their recognition and monitoring are of primordial importance in biological mechanisms, medicine and environment. The design of anion receptors is particularly challenging due to their larger size than isoelectronic cation, their strong hydration, their variety of geometries, and their sensitivity to pH. Despite numerous progress have been achieved, selective anion recognition is a real challenge, especially in water and biological media due to the intrinsic characteristics of anions.

Our research group has designed powerful receptors of anions based on bambusuril skeleton and evaluated their affinity towards halides. These neutral cavitands with a jigger-like conformation are prepared from cheap reagents using an easy and fast synthetic procedures. We have shown that such molecules exhibit highly specific recognition for iodides in organic and aqueous media making them the most efficient complexing agents currently known for which applications as sensors and imaging agents can be envisaged. Moreover, we have shown that bambusurils can be used as multivalent platforms to link glycosidases inhibitors derived from 1-deoxynojirimycin (DNJ). These neoglycobambusurils caging-anions have inhibitory constants in the nanomolar range.

Bio:

Dr. Marie-Pierre Heck studied organic chemistry at the University of Strasbourg (France). She obtained her PhD degree entitled " Synthesis of amidines of therapeutic interest" in 1994 from the University of Strasbourg, under the supervision of Dr. Charles Mioskowski. She then completed a 2 years post-doctoral training with Pr. Chi-Huey Wong at Scripps Research Institute (La Jolla, California) with a Lavoisier fellowship from the french minister during which she developed glycosidase inhibitors and sialyl Lewis X mimetics.

Since 1996, she has a permanent position at the Alternative Energies and Atomic Energy Commission of France (CEA) where she is leading the chemistry group "Development of new methodologies in organic synthesis and synthesis of bioactive molecules". Her main fields of interest are organic chemistry in relation and applications to biological problems, macrocyclic chemistry, supramolecular assemblies, cage-molecules for gas encapsulation and macrocycles for anions chelation applied to labelling and imaging.