OLIGOPYRROLE-BASED MOLECULAR RECEPTORS: FROM ANION BINDING TOION-PAIR RECOGNITION

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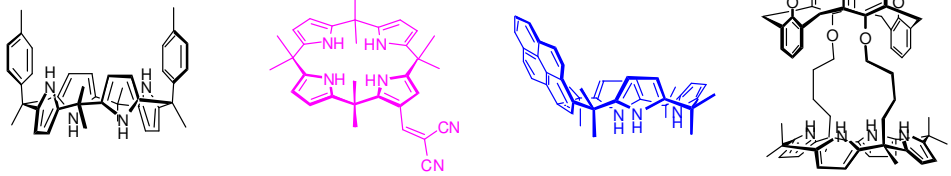
Development of molecular receptors possessing high affinity and selectivity for various targeted guest molecules, have been an ongoing challenge in the field of supramolecular chemistry. As results, many model systems utilizing various molecular scaffolds have been developed and studied. Among the various neutral anion receptors, calix[4]pyrroles and their congeners have been shown to bind anions, ion-pairs and neutral moleculaes in organic media. Encapsulation of the binding domain of the calix[4]pyrrole greatly enhances the binding affinity. Based on these results, we have designed and synthesized new calix[4]pyrrole-based ion/molecular receptors that bear diametrical strap on one side of the calix[4]pyrroles. The strapping elements were consisted with various functionalities including oligoethers, benzo-crown, amide, urea, pyrrole and chromogenic units. One of the pyrrole in the calix[4]pyrrole macrocycle was replaced with other aromatic system including fluorescence pyrene moiety. The binding studies indicated that most of the synthesized systems show superior binding ability for anions, ion-pairs and neutral molecules. We have demonstrated that the hybrid systems containing chromogenic or fluorogenic reporter groups could be excellent chemosensors. Through binding studies we found that the systems could be applied to the recognition of ion-pairs as well as neutral molecules. More recently, we found that vinyl-substituted calix[4]pyrroles can be selective chemodosimeteric sensor for cyanide anion. Differences seen among the various strapping elements support the idea that calixpyrrole-based customized anion receptors can be effectively designed. These will eventually lead to the development of the real sensor systems. We will present the versatility of the oligopyrrolic macrocycles including strapped calix[4]pyrroles, modified calixpyrroles, and modified expanded porphyrins in anion recognition.



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