Glenn T. Seaborg Center Seminar

Oligopyrrole-based Receptors for Potentially Hazardous Materials

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Building 70A, Room 3377

The design and synthesis of novel receptors with the ability to recognize, extract, or signal selectively specific analytes through easy-to-visualize changes in color constitutes a critical goal in macrocyclic and supramolecular chemistry. We have approached this broad objective via the construction of both cyclic and acyclic pyrrole-based receptors that are able to interact with cationic, anionic, and neutral substrates through various combinations of metal coordination, hydrogen bonding, electrostatic, and donor-acceptor interactions. Systems that have been the focus of specific inquiry included calixpyrroles, expanded porphyrins, and various open chain mono- and oligopyrrolic species. More elaborate systems containing a wide range of building blocks, including bipyrrole, bis(pyrrolyl)benzene, biimidazole, carbazole, and various non-pyrrolic heterocyclic subunits, are now known and are beginning to be explored as receptors for potentially hazardous neutral and anionic targets. In this lecture, the synthesis and study of various pyrrole-based receptor systems will be reviewed with a view to understanding the underlying design principles. The focus will be on systems that allow for the specific extraction and/or colorimetric detection of potentially hazardous analytes, including such canonical risks as high-valent radioactive actinide cations, the sulfate and pertechnetate anions, as well as electron deficient nitroarene explosives. New efforts to develop polymeric systems featuring either appended anion or receptors or those that contain such binding agents within their constitutive framework will also be summarized.

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