Journal of Analytical Methods in Chemistry

Hindawi

Special Issue on

Supramolecules for Transition Metal Ion Sensing

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The design and modification of supramolecules have gained wide interest owing to their potential applications in biomedicine, environment sustenance, and chemosensing studies. Since past decade, the molecular ion recognition studies have captured interests of inorganic, analytical, and medicinal chemists. Among these metal ions, the rare earth metals being Lewis acids have high affinity towards supramolecules which are Lewis bases by nature, resulting into ion sensing. Rare earth metals consist of seventeen elements and is divided into two categories, namely, the light rare earths that include Cerium (Ce), Lanthanum (La), Neodymium (Nd), Praseodymium (Pr), and Samarium (Sm) and the heavy rare earths that include Gadolinium (Gd), Europium (Eu), Terbium (Tb), Dysprosium (Dy), Thulium (Tm), Ytterbium (Yb), Lutetium (Lu), Yttrium (Y), Holmium (Ho), and Erbium (Er). The qualitative and quantitative analysis of rare earth metals is essential owing to their little abundance in nature and threat as potential environmental pollutant. Thus, their detection and treatment are of great importance for environmental and safety reasons.

Optical chemosensors represent the smart analytical tools which have become very popular and valuable in the last two decades. Their advantage owes to the number of features such as noninvasiveness, absence of electromagnetic interferences, possibility of miniaturization, and suitability for imaging. Optical chemosensors are versatile and posses potential applications as planar optodes, ion-sensing, fiber-optic (micro) sensors, sensor paints, nanoparticles, water purification, and microelemental analysis. The developments in metal ion analysis have led to the creation of molecules through noncovalent interactions leading to intricate molecular assemblies. These assemblies are supramolecules and have capability of exhibiting new emergent properties, which are unpredictable and unique. Supramolecules are large and ensemble caged electron-rich molecules having tendency to attract and complex with metal ions. The host-guest relationship between supramolecule and metal ion depends upon size of cage and position and number of donor binding sites that are usually N, O, and S. Supramolecular chemistry is a chemistry beyond conventional molecular binding having intermolecular, electrostatic, hydrogen bonded, or covalently bonded interactions. The extent and type of bonding depend upon presence of conjugated system and presence of chromophores and donor atoms. This creates most unusual compounds and finds applications in molecular recognition, host-guest chemistry, molecular self-assembly, and mechanically interlocked molecular architectures.

Potential topics include but are not limited to the following:

- Molecular recognition and host-guest chemistry
- Recognition of cationic/anionic/neutral molecules
- Molecular design for biologically active transition metal ions
- Supramolecule–metal ion complex as catalyst
- Enzymes as ion recognition sites
- Biomimetics as model for ion sensing
- Structural cooperativity in metal ion binding
- Spectroscopic methods for supramolecular chemistry including modern/advanced NMR techniques
- Absorption and emission studies for chemosensing
- Powder X-ray fluorescence techniques for detection of rare earth metals

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