

第 294 回化学コロキウム

題目：ESR Spectroscopy for Fullerene Chemistry

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概要

On finding that fullerenes can persistently trap for atoms, researchers have been attracted by endo-fullerenes in terms of the possibilities for the free tuning of “outside chemistry” and of “inside confinement”. An important question to ask is how the inside atom controls the outside chemistry of the fullerene cage, or how the topology and size of the outside cage regulate the electronic structure and dynamics of the atom confined inside. Electron spin resonance (ESR) spectroscopy was used for the investigation of endo-fullerenes initially, and they have been the most powerful methods of examining these. Compared to other methods, for example X-ray diffraction measurement, magnetic resonance spectroscopy offers a less direct method for structural determination, the ESR technique nevertheless has advantages in the investigation of highly diluted materials. Observations across a wide temperature range are practicable, which makes it possible to probe the binding potential and to test the influence of solvents. As a result, these approaches can give information not only on the molecular tumbling motion in solution but also on the intra-molecular dynamics. In addition, it is possible to reduce the target fullerene by using chemical or electrochemical methods in solution, which permits the charge redistribution under the condition of electron excess to be probed. Some interesting examples in these respects will be presented.

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