

# Seminar #12

November 13, 2020, 11:30 am

## *The Design, Synthesis, and Self-Assembly of C<sub>5</sub>-Symmetric Pillar[5]arenes and Tiara[5]arenes*

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From medieval alchemy to modern chemistry, symmetry has always been a key element both aesthetically and scientifically in shaping human perceptions across different length scales. Over the last decades, increasing scientific attention has been devoted to systems with five-fold symmetry, e.g. aperiodic quasicrystals, metal-organic assemblies resembling Platonic and Archimedean solids, as well as many biomolecules such as icosahedral virus capsids.

In 2008, a class of new macrocycle, pillar[5]arenes (P[5]s), was introduced by T. Ogoshi and co-workers, and soon became popular molecular scaffolds in supramolecular and macrocyclic chemistry communities. In view of taking advantage of this unique five-fold molecular scaffold, our research group developed a "pre-oriented" protocol, leading to convenient and selective syntheses of C<sub>5</sub>-symmetric P[5]s, which feature two types of different chemical functionalities on their two rims. Furthermore, a variety of chemical modifications can be effectively executed on the macrocyclic scaffolds, including routine alkylation, esterification, C-C coupling and SuFEx reactions. These synthetic efforts also made it possible for us to construct a new five-fold symmetric oligophenolic macrocycle, the tiara[5]arenes (T[5]s), that are not accessible from the addition of formaldehyde to phenol, for the first time.

In this webinar, the design and synthesis strategies of these novel macrocycles will be introduced. Attention will also be paid to their applications in supramolecular chemistry, both in solution and in the solid state. In addition, examples of employing these five-fold symmetric building blocks for constructing complex architectures will be shown.



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