

Elusive Pyramidanes Synthesized

Germanium- and tin-capped square pyramid molecules are the first examples of this class of polyhedral compounds



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As geometrically interesting molecules go, chemists have predicted that an all-carbon square pyramidal structure, called a pyramidane, would be a great synthetic target. If for no other reason, they could study the unusual bonding of its highly strained polyhedral framework. Pyramidane and its isomers have been thoroughly investigated via computational chemistry, but no one has been able to make a stable sample.

Vladimir Ya. Lee and **Akira Sekiguchi** of the University of Tsukuba, in Japan, and their colleagues have now come close by preparing a couple of kissing cousins: carbon squares capped by

germanium or tin, $\text{Ge}[\text{C}_4(\text{Si}[\text{CH}_3]_3)_4]$ and $\text{Sn}[\text{C}_4(\text{Si}[\text{CH}_3]_3)_4]$ (*J. Am. Chem. Soc.* 2013, DOI: **10.1021/ja403173e**). The researchers made the compounds by coupling silyl-

substituted cyclobutadiene dianion salts with germanium and tin dichloride dioxane complexes. It turns out that the properties of the pyramidal molecules, which lie between purely organic compounds and transition-metal compounds, could lead to practical applications, Sekiguchi says. Transition-metal complexes featuring π -bonded cyclic polyene ligands, such as the iron complex ferrocene with its cyclopentadienyl groups, helped revolutionize the field of transition-metal chemistry and catalysis, he notes. Sekiguchi envisions that the pyramidanes could further bolster the field by serving as precursors for new transition-metal cyclobutadiene complexes.

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