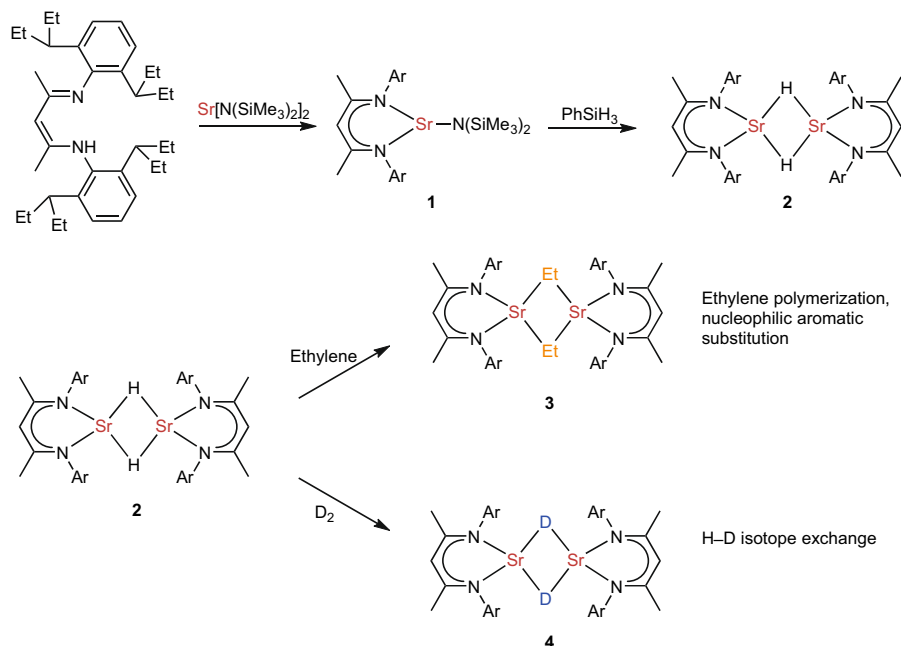


METAL ALKYL COMPLEXES

Stable strontium

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Metal alkyls have a prominent place in organic synthesis. For instance, organomagnesium and organolithium compounds are among the first choices for carbon nucleophiles and bases, as well as taking part in catalytic reactions such as the Kumada coupling. But, as you go further down groups 1 and 2 in the periodic table, the corresponding metal alkyls become more unstable or, in many cases, have not even been isolated. It is only in recent years that unstabilized alkyl–calcium compounds have been prepared, by the use of bulky ligands and alkene insertion into Ca–H bonds.

Now, Sjoerd Harder and colleagues at the Universität Erlangen–Nürnberg in Germany have achieved this feat in the even more challenging case of strontium. The key step was the use of a super-bulky ligand — bulkier even than those successfully employed for calcium complexes. Combining such a ligand with $\text{Sr}[\text{N}(\text{SiMe}_3)_2]_2$ led to the formation of the surprisingly stable complex **1** (see Fig.). X-ray studies showed that the stabilization

was not just the result of ligand size, but also due to agostic interactions between Sr and the C–H bond in the 3-pentyl group. Addition of PhSiH_3 produced the strontium hydride dimer (complex **2**), which is also stable and soluble in apolar solvents.

With this complex in hand the team could explore its chemistry. The hydride dimer engaged in H–D isotope exchange in C_6D_6 solution (leading to the production of deuterated analogue **4**), and acted as a catalyst for benzene deuteration with D_2 . Significantly, an unstabilized alkyl strontium complex **3** was easily formed by the addition of ethylene. Initial exploration of the reactivity of this species showed that it could polymerize ethylene and also alkylate C_6D_6 via nucleophilic aromatic substitution. Given these initial results, it will certainly be interesting to see what reactivities develop from these species in the future.

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