Future options for storing carbon dioxide: Synthesis of inorganic heteroalkenes

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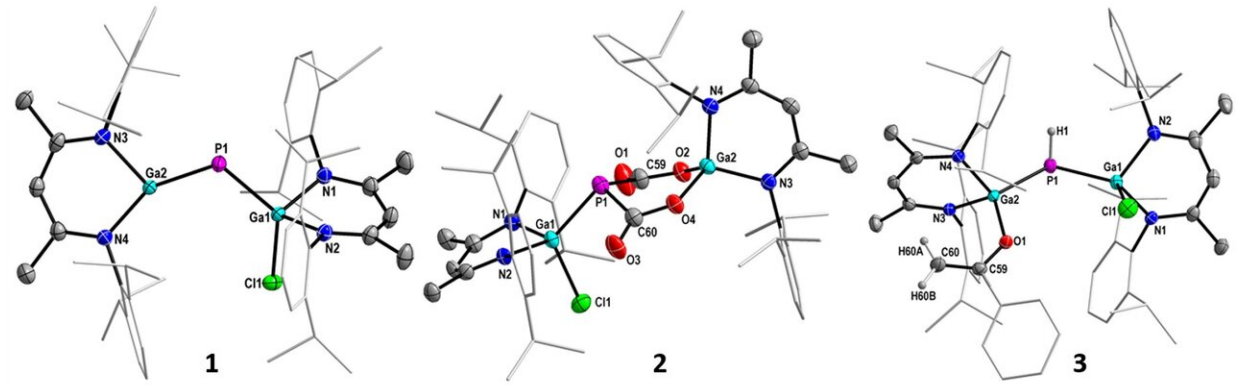

Structures of the gallaphosphene (1) and the complex of CO_2 (2) and acetophenone (3). (c) UDE/S.Schulz

Group 13/15 heteroalkenes RMER' with M-E double bonds (M = B-Tl; E = N-Bi) offer promising potential for bond activation reactions, but they are difficult to prepare. A team led by CENIDE professor Stephan Schulz now describes new synthetic methods for group 13 metallapnictenes in no less than three articles in the journal *Angewandte Chemie*. They allow for the preparation of preparative amounts as a basis for systematic reactivity studies.

It was shown that the gallaphosphene L(CL)Ga=P-GaL (L =β-diketiminate) not only selectively activates the C(sp3)-H bonds of

acetone and acetophenone, but also CO_2. The latter reaction is even completely reversible in this process, and thus the bound CO_2 can be re-released with reversion of the gallaphosphene at 90 °C.

"I would never have thought that such a reversible reaction, that reveals new options in CO_2 storage, was possible. Together with CH activation, the supreme discipline in organometallic chemistry, this results in a wide range of options—including catalytic reactions," Schulz says.

More information: Bin Li et al. Synthesis and Reactivity of Heteroleptic Ga-P-C Allyl Cation Analogues, *Angewandte Chemie International Edition* (2020). DOI: 10.1002/anie.202012595

Julia Krüger et al. From π-Bonded Gallapnictenes to Nucleophilic, Redox-Active Metal-Coordinated Pnictanides, *Angewandte Chemie International Edition* (2020). DOI: 10.1002/anie.202013618

Stephan Schulz et al. Multi-talented gallaphosphene for Ga–P–Ga heteroallyl cation generation, CO_2 storage and C(sp3)–H bond activation, *Angewandte Chemie International Edition* (2020). DOI: 10.1002/anie.202014381

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