

## **Ammonia as hydrogen carrier molecule: a challenge for catalysis**

Claudia Weidenthaler, Max-Planck-Institut für Kohlenforschung, Mülheim an der Ruhr, Germany

Over the last decade, ammonia became considered a highly suitable candidate for the chemical storage of hydrogen. There are many arguments in favour of ammonia as a carrier molecule: the “green” synthesis of ammonia is intensively studied and technically feasible. Ammonia has a high hydrogen content and is easy to transport. While ammonia synthesis is an established large-scale process, the decomposition of ammonia is so far not been realized on a large scale. Both synthesis and cracking of ammonia require the use of catalysts. The catalyst should reduce the cracking temperatures, lead to a complete conversion, and need to guarantee long-term stability. Several studies have shown that a good synthesis catalyst is not necessarily also the best catalyst for the decomposition of ammonia. Different classes of catalysts have been tested, covering precious metals, transition metals, metal nitrides and carbides, as well as imides and amides. All of these catalyst materials have advantages but also limitations. The influence of the different support, as well as promoters on the catalytic activity, is still under debate. Systematic test procedures making experimental data comparable would be advantageous. In addition, the in situ/operando characterization of the catalysts during the reaction is mandatory if we want to understand the catalytic behaviour of the different catalysts and based on this, adjust the catalysts accordingly.