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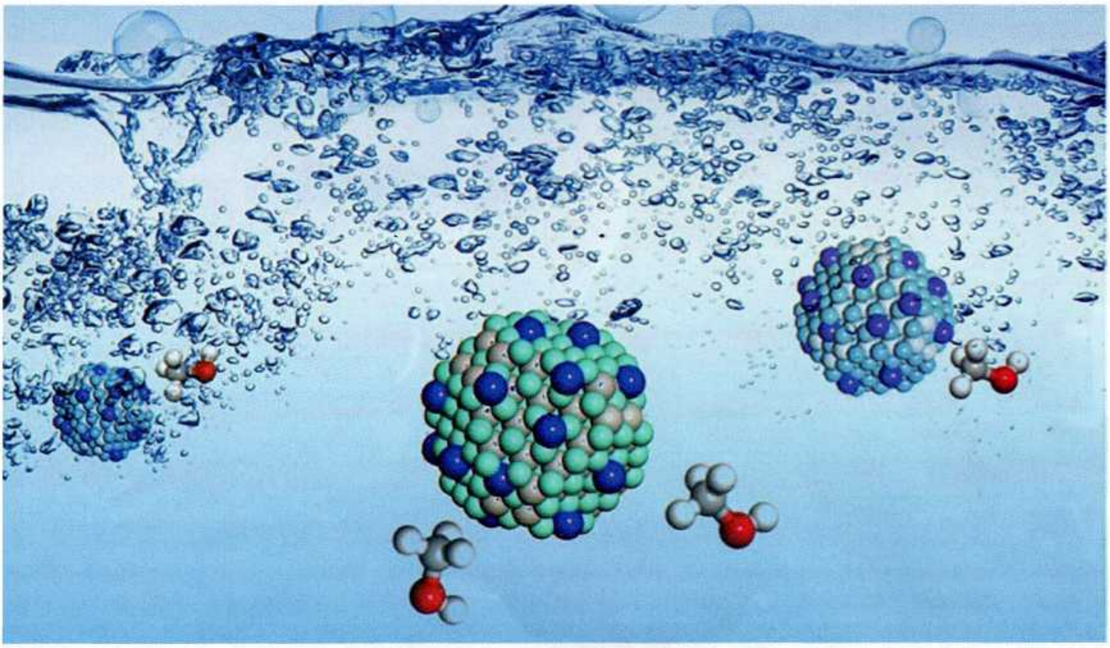

Hydrogen can be stored in methanol and released on demand through an efficient catalytic process designed by PKU researchers.

HYDROGEN ENERGY
AND CUTTING-EDGE CHEMISTRY

The College of Chemistry and Molecular Engineering (CCME) at Peking University (PKU) is one of the oldest departments of its kind in China. With roots in the Chemistry Division of the Imperial University of Peking, which was established in 1910, CCME has emerged as a major player in chemical education and research in modern China.

The past century has witnessed a multitude of pioneering discoveries at CCME, from the complete synthesis of crystalline bovine insulin in 1965, a world first, to establishing international standards of relative atomic masses of 10 elements in the 1990s. The discovery of the spontaneous monolayer dispersion principle in the late 1970s led to China building the world's largest air separation factory in 2007. Today, CCME researchers continue to make breakthroughs in many major areas.

For example, they have tackled a fundamental obstacle in theoretical chemistry – the high-precision calculations of electronic structures and physical properties. By integrating relativistic theory, multi-body physics and quantum electrodynamics, theoretical and computational chemists at CCME have developed a new form of the relativistic quantum chemistry, leading to a series of breakthroughs concerning the computation of excited states and the relativistic treatment of nuclear spin.

Chemists at PKU are active in organometallic chemistry, organic opto-electronic materials and total synthesis of natural products. A recent example is the synthesis of complex triterpenoids, a chemical compound originally isolated from a medicinal herb and typically used for treating hepatitis. Such research will facilitate the development of small-molecule probes to better understand the biological activity and pharmacological potential of compounds used in traditional Chinese medicine.

Another active research area is energy chemistry. Polymer electrolyte membrane fuel cells that run on hydrogen are among the most promising alternatives for future power supplies. For safe storage and transportation, hydrogen needs to be stored as liquid organic compounds and released on demand on site. CCME scientists designed a novel catalyst that enables efficient hydrogen production from methanol and water at a low temperature, paving the way towards commercially viable hydrogen storage.

Polymer chemists at CCME also strive to expand the capacity and scope of soft materials to address growing societal needs. They have created mesogen-jacketed liquid crystalline polymers for use as building blocks for versatile, hierarchically ordered nanostructures that can be used in energy and other fields.

CCME researchers are building novel chemical tools to expand understanding of life processes and control them with molecular precision. Their development of a bio-orthogonal cleavage reaction has coupled the genetic-code expansion strategy with metal-catalyzed or small molecule-triggered elimination reactions to activate specific protein functions inside living systems. This work has extended bio-orthogonal chemistry from ligation to elimination reactions, leading to broad applications ranging from gain-of-function studies of proteins to in-situ activation of prodrugs within an in-vivo setting.

For the benefit of society, CCME aims to promote innovative and integrative chemical research in all frontiers by asking new questions, discovering new reactions, developing new methods, creating new materials and understanding the underlying molecular mechanisms. It is establishing a new management system that supports the development of cutting-edge science and the growth of innovative talents. By optimizing resource allocation, it is integrating and expanding its research platforms to provide sustainable support for the investigation of scientific problems. Furthermore, current energy, natural resources and health challenges in China offer CCME unique opportunities to conduct proactive researches that can be translated to shape future industrial landscapes. CCME is in a strong position to make greater contributions to chemical education and research globally. ■