Special topic on strategies for developing energy-related physical chemistry

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Received October 14, 2017; accepted October 15, 2017; published online October 20, 2017

Citation: Tian ZQ, Zheng NF. Special topic on strategies for developing energy-related physical chemistry. *Sci China Chem*, 2017, 60: 1377–1378, doi: 10.1007/s11426-017-9157-1

Increasing global energy demand and environment issue have pushed us to develop technologies for efficient utilization of fossil fuels and also seek for renewable energy resources. Chemistry plays a crucial role in the acquisition, generation, distribution, and utilization of energy in different forms although it is not the only contributing subject. Currently, fossil fuels are the primary source to provide the majority of the world's energy. While the efficient utilization of fossil fuels requires deep understanding of the energy transformation processes associated with the breaking and reorganization of chemical bonds, the use of many renewable energy resources often involves chemical transformations with electron transfer. For these reasons, energy chemistry has been recently emerging as a new interdisciplinary area to address chemistry issues associated with energy technologies.

Energy chemistry mainly utilizes the theories and methods of chemistry to discover the principles of energy harvesting, storage, conversion and transportation, for guiding the development of energy technologies to meet our future needs. As a highly interdisciplinary discipline of physical chemistry, material chemistry, chemical engineering and many others, energy chemistry covers a wide range of interesting topics, such as optimal utilization of carbon resources, chemical energy storage and conversion, solar energy conversion chemistry, fuel combustion chemistry,

high-temperature energy conversion chemistry, surface and interface chemistry involved in energy processes, preparative chemistry for creating new materials for energy applications.

As the largest country in energy consumption in the world, China is facing severe energy-related challenges caused by energy resource shortage, massive energy consumption, high fossil energy consumption (particularly coal), increasing environmental pollution. The development of energy chemistry is expected to have a big impact on the national energy policy and security of China. In this special topic, we are highlighting some research work on energy chemistry associated with the energy challenges in China, covering syngas conversion, electrochemical energy storage, combustion chemistry, high temperature steam electrolysis, and also energy chemistry systems engineering. The topic collects 5 contributions, including 2 review and 3 perspectives. Obviously, this collection is too limited to reflect the rapid development of energy chemistry in China. The purpose of this collection is just to throw away a brick in order to get a gem. With the collection, we hope more energy chemistry frontier research will be carried out for developing innovational technologies to tackle the energy challenges in China.

Finally, we would like to thank all the authors and reviewers for their great contributions to this special topic.

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