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• EDITORIAL •
• SPECIAL TOPIC • Porous Organic Polymers

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Special topic on research frontiers in porous organic polymers

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Porous organic polymers (POPs) are materials with covalently bonded, thermally stable backbones that exhibit large accessible surface areas and intriguing properties applicable to fields such as gas storage and separation, catalysis, and optoelectronics. Compared to analogous inorganic porous materials, POPs feature a wider range of pore size, larger surface area, readily available functional groups for post-synthesis functionalization, etc., which enables their design for targeted applications.

The development of POPs is now an active research area, both internationally and in China. Since 2014, there have been two national symposiums on POPs in China, and the 1st International Symposium on Porous Organic Polymers will be held in September 2017. To highlight some of the most fruitful outcomes of this booming research field, we edited this special topic of porous organic polymers for *Science China Chemistry*, aiming to stimulate further innovation in the field. This special issue includes three Mini Reviews, three Reviews, four Articles, and two Communications, with a balance of contributions from China and overseas. The contents cover currently hot research topics including design, synthesis, and a broad range of emerging applications of POPs.

The design and synthesis of POPs together form the foundation of the development of POPs. In his review article, McKeown summarizes the progress in the synthesis of polymers of intrinsic microporosity (PIMs) over the past decade. Unlike other types of POPs, PIMs are not composed of a network of cross-linked covalent bonds and thus, can be dissolved in organic solvents and easily processed for different applications. In addition to designing the internal porosity, designing the morphology has attracted increasing attention. Tan and coworkers review the application-targeted design of microporous organic polymers using hard templates, soft templates, and direct synthesis methods. In a research article, Liang *et al.* report the design of 1D microporous heterogeneous nanowires. Similarly, Sun *et al.* report the templated synthesis of core-shell and hollow spherical covalent organic frameworks, a large class of POPs with short-range ordered structures. Moreover, new synthesis chemistry is always a hot topic in POPs research. Widling *et al.* report a thermo-activation protocol for synthesizing a microporous polymer using readily available iodoaryl monomers.

The designability of POPs means that possible applications are only limited by the imagination. In turn, emerging applications of POP materials stimulate the development of new synthesis methods for POPs. For example, gas capture and storage represents an important field for POPs. For these applications, the surface area and chemical functionality of the pores are equally important. Zhou and coworkers review the development of POPs for CO_2 capture. Hedin and coworkers review the synthesis and application of microporous polymers with a focus on sustainability, such as the capture, storage, and catalytic conversion of a range of important chemicals. Sun *et al.* report the synthesis of thiophene-based conjugated organic polymers (COPs) for gas adsorption. Xu *et al.* report the synthesis of tetra-armed

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COPs for gas adsorption and photocatalytic hydrogen evolution. Applying POPs as catalysts is always desirable. Zhang and coworkers review the development of POPs as non-precious-metal-based electrocatalysts for the oxygen reduction reaction. Meanwhile, Zhao *et al.* review the synthesis of chiral covalent organic frameworks for asymmetric catalysis and chiral separation. Wang *et al.* report the synthesis of POP nanotubes as luminescent probes to sense Fe^{3+} with high selectivity and sensitivity.

The development of POP materials is still in its early stages. The abovementioned articles demonstrate that new synthetic protocols are under development, and new applications are emerging. Thus, this active field embodies the interplay between synthesis and application.

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