Functional porous materials with intrinsic periodic (sub)nanometric pores, such as microporous zeolites, mesoporous silica, metal–organic frameworks (MOFs), and covalent organic frameworks (COFs), have found wide applications because of their excellent adsorption, separation, ion-exchange, and catalytic properties. The natural occurrence of zeolites was first discovered in 1756, with the aluminosilicate mineral stilbite, and their artificial synthesis began from the 1940s (Figure 1). The well-defined subnanometric micropores in zeolite frameworks provide an ideal void space ($d < 2$ nm) for guest molecules/ions to enter, diffuse, and exchange, making zeolites important adsorbents and detergents. In addition, the space confinement effect of zeolites, together with their tunable chemical composition, acidity, and active sites, makes zeolites the most important series of heterogeneous catalysts in today’s petrochemical industry. In addition to these traditional applications, zeolites have recently shown great potential in emerging scenarios, such as biomass conversion, energy storage, $\text{CO}_2$ capture and conversion, and host–guest assembly, representing new opportunities of zeolites in sustainable chemistry.

Since the 1990s, the family of functional porous materials has been growing rapidly. The invention of mesoporous silica MCM-41 in 1992 has been well acknowledged as the beginning of the development of ordered mesoporous materials (Figure 1). In comparison with zeolites, mesoporous materials possess larger pores ($2$ nm < $d$ < 50 nm) and more diverse chemical compositions (e.g., nonmetal oxides, metal oxides, pure metals, and carbons, etc.), which have found promising applications in catalysis, sensing, electronic devices, and drug delivery, etc. MOFs and COFs are relatively new members in the family of crystalline porous materials (Figure 1). Different from traditional porous materials that are built from the assembly of primary atoms, MOFs and COFs are constructed by the connection of inorganic/organic nodes and organic linkers via coordination or covalent bonds. By sophisticated selection of the building blocks, as well as the underlying network topology, the shapes and sizes of the nanopores in MOFs and COFs can be well controlled, making MOFs and COFs promising materials in applications such as gas separation and storage, energy conversion, biomedicine, and catalysis. In addition, porous carbon spheres, hollow multishelled structures, and crystal-like porous organic salts have attracted much attention in the past several years because of their superior catalytic activities, electro-/photochemical properties, and ion conductivities.

One of the main driving forces for the recent advances in functional porous materials is attributed to international collaborations and interdisciplinary integration. The inclusion of researchers from different countries/regions with diverse backgrounds and perspectives will foster in-depth interdisciplinary integration, significantly boosting the scientific innovation to tackle global problems. In 2017, the international collaboration project on “Functional Nanoporous Materials” was initiated in Jilin University, China. Under the framework of this project, an international collaboration network was established with the aim of addressing energy and environmental challenges via the design, synthesis, and application of functional porous materials. To date, more than 60 researchers from over 20 countries/regions have participated in this project, making important contributions to the recent progress of functional porous materials.

To showcase the cooperation achievements in this research project, Advanced Materials and Angewandte Chemie launch a joint special issue on functional porous materials chemistry. The special issue of Advanced Materials features 18 reviews covering the synthesis, characterization, and application of various types of functional porous materials. The development in the synthetic chemistry lays the foundation for the recent progress in porous functional materials. In particular, the novel synthetic strategies for hierarchical (article number 2004690) and water-stable zeolites (article number 2003264), the synthesis of porous carbon spheres from polymer colloids (article number 2002475), the design of robust MOF networks with high connectivity (article number 2004414), and high-throughput and computer-aided approaches (article number 2002780), have promoted the discovery of a wide variety of porous materials. Meanwhile, advances in high-resolution and in situ characterization techniques, such as solid-state NMR (article number 2002879) and X-ray adsorption spectroscopy (article number 2002910), have given important clues to reveal the structure–property relationship of functional porous materials, providing important guidance for their applications in different scenarios. Catalysis is one of the most important applications of porous materials. In particular, the use of zeolites in a number of industrially important and sustainable catalytic processes has attracted much attention in the recent years, such as the catalytic conversion of $\text{CO}_2$ molecules (article number 2002927),
non-oxidative methane dehydroaromatization (article number 2002565), and hydrogen generation from liquid chemical hydrogen-storage materials (article number 2001818). For MOFs, the storage and separation of H₂, CO₂, CH₄, and hydrocarbons, etc., are the active research topics (article numbers 2002563 and 2002603). Besides these traditional applications, the electrochemistry of functional porous materials has recently become an emerging hot research area. Porous metals, metal oxides, or carbons can be made as electrocatalysts for important reactions such as hydrogen evolution and oxygen reduction (article number 2002435); zeolites, MOFs, COFs, and mesoporous nanomaterials can be used to construct electronic devices, such as capacitors, conductors, and electrodes in batteries and fuel cells (article numbers 2002038, 2002559, and 2004654). Meanwhile, hollow multishelled structures are emerging as promising photocatalysts for the degradation of pollutants, photocatalytic water splitting, CO₂ reduction, and organic transformations (article number 2002556). Crystalline porous organic salts are another new type of functional porous materials, which have recently shown promising performance in proton conductivity, CO₂ diffusion, molecular rotors, and energy transfer (article number 2003270). This special issue only highlights some of the recent progress in functional porous materials, and we can look forward to many exciting innovations in this area via collaboration and interdisciplinary integration, which will make a continuously growing impact on the sustainable development of our societies.

**Figure 1.** Milestones in the history of functional porous materials.

Jihong Yu received her Ph.D. in inorganic chemistry from Jilin University in 1995 and worked as a postdoctoral fellow first at the Hong Kong University of Science and Technology and then at Tohoku University in Japan during 1996–1998. She has been a full professor in the Chemistry Department, Jilin University, since 1999. Her main research interest is in the designed synthesis and application of zeolitic nanoporous materials in energy, environment, and other emerging fields.
Avelino Corma studied chemistry at the Universidad de Valencia (1967–1973) and received his PhD at the Universidad Complutense de Madrid in 1976 with Prof. Cortés. He was a postdoctoral researcher with Prof. Wojciechowski in the department of chemical engineering at Queen’s University (Canada, 1977–1979). Since 1990, he has been a professor at the Instituto de Tecnología Química (UPV-CSIC) at the Universidad Politécnica de Valencia. His current research focuses on the synthesis, characterization, and reactivity of acid–base and redox catalysis.

Yi Li received his Ph.D. degree from Jilin University in 2006, and joined the State Key Laboratory of Inorganic Synthesis and Preparative Chemistry at Jilin University as a lecturer. He was promoted to associate professor in 2009 and to full professor in chemistry in 2014. His research focuses on the computational chemistry and cheminformatics of functional nanoporous materials.