This year again, *CrystEngComm* celebrates the contributions from researchers that are at the start of their independent career, or have just entered the broad field of crystal engineering. Invitations to contribute to our 2016 New Talents issue turned out to be an outstanding success by all measures, with over 60 exciting papers covering topics ranging from the design of nanomaterials, organic frameworks, polymorphism of organic solids, to metal-organic frameworks (MOFs), contributed by authors from four continents, namely Australia, Austria, Canada, China, France, Germany, India, the Netherlands, Singapore, South Korea, Spain and United Kingdom.

Among these papers, a large fraction deals with **coordination polymers** and **MOFs**, whose use in advancing organocatalysis has been reviewed in an elaborate, detailed highlight from the Herrera and Díaz Díaz groups.1 The discovery of a new, unique (3,9)-connected topology, with abbreviation **wys**, is presented by the Zhang group2 at Sun-Yat Sen University in the form of a MOF constructed from trigonal-prismatic cobalt clusters and tripodal ligands. Further advancing the design of MOFs, the Kou3 group from Tsinghua University reports an “inverted” approach to a family of microporous materials by combining nickel-based tectons as linkers and a four-connected organic unit as a node. A related “metal-as-linker” design is exploited in the synthesis of one-dimensional (1-D) coordination polymers by the Wang4 group at Nanjing University. They used sterically-hindered macrocyclic ligands to design a family of building blocks containing CoII in a pentagonal-bipyramidal environment which, in combination with suitable organic bridging units, led to topologically and magnetically diverse coordination polymers. Macrocycles, but this time with pendant carboxylate arms, were also exploited by the Maspoch5 group in an ingenious, two-step strategy to synthesise bimetallic coordination polymers, by first coordinating the macrocycle onto a NiII or a MnII ion, and then bridging the resulting metallomacrocycles *via* zinc ions. Control over the structure of MOFs has been addressed also by the Gascon group,6 who investigated how to avoid interpenetration of MOFs grown on a copper surface.

Several contributions deal with engineering MOF particle size or growth of thin MOF films. The former is represented by the joint report from the Serre and Horcajada7 groups, addressing scalable synthesis and particle size control for a biocompatible framework MIL-127(Fe). The emerging area of MOF nanoparticles is the topic of a very interesting highlight by the Wuttke8 group, who gave an excellent, comparative overview of methods for characterisation of these novel materials. Several other contributions focused on control over particle morphology through interaction of MOFs with organic molecules or surfaces: the Liang and Falcaro groups9 described the influence of amino acids on particle properties of a popular material ZIF-8, while the Coskun group10 demonstrated a method to achieve MOF thin films by growing the well-known framework HKUST-1 on graphene oxide. In a different contribution on the same MOF, the Sun group11 systematically explored the effect of simple salts on crystallisation of HKUST-1, revealing a means to control size and morphology of micro- and nano-MOF particles. That the particle size can have a pronounced effect on the stability of MOF structures was elaborated by the Sumby group,12 who reported how a reduction in particle size facilitates the transformation of a metastable three-dimensional (3-D) to a two-dimensional (2-D) variety of a copper(II)-based MOF, shortening the reaction time from one week to under 3 hours.

The contributions in the area of MOFs and coordination polymers reveal considerable interest in microporous solids with new or switchable optical properties, achieved either through the introduction of luminescent ligands, or through incorporation of lanthanide metals as framework nodes. The latter approach was exploited by the Wang group13 at the Technical Institute of Physics and Chemistry of the Chinese Academy of Sciences, who synthesised white-emitting mixed-metal MOF materials involving europium and terbium. The Li group14 at the Jilin University demonstrated four novel fluorescent MOFs, where the fluorescence is achieved by the presence of lanthanide (Gd3+) ions, as well as different types of oligomeric (Cu2I2)*n* clusters (*n*=1-4), one of which also demonstrated mechanoresponsive behavior, *i.e.* fluorescence quenching upon friction and impact. Anion-induced control over the dimensionality and overall structure of such 3*d*-4*f* coordination materials, composed of Ni2+ in combination with La, Nd, Dy or Gd, is investigated in a joint contribution coming from the Kong and Long groups at Xiamen University.15

One potential application of luminescent MOFs is for molecular sensing, as demonstrated by the joint contribution from the Liang and the Li groups16 at Jilin University. They utilised MOFs for detection of explosives based on nitrated aromatics. Fluorescence quenching, which enabled the sensing on nitrobenzene in dilute solution, was also reported by the Hong group17 at Korea University, in a systematic study of structures and dynamic of zinc-based mixed-ligand carboxylate MOFs with bis(imidazole) ligands. The Biswas group18 demonstrated how highly toxic H2S gas can be detected by nitro- and azido-functionalized UiO-66 materials, while the Zhao group19 from Nankai University utilized 3-oxapentane- and glycerol-based MOFs for CrO42- and Cr2O72- detection.

Another aspect of MOFs is their dynamic behavior. An experimental study of the water-induced interconversion between a 2-D and a 3-D copper(II) MOF based on the same pyridinecarboxylate ligand is provided by the Ghoshal group,20 while the Tan group21 from the University of Oxford provided a detailed study of structural dynamics in the popular framework HKUST-1 using terahertz vibration spectroscopy, coupled with theoretical density functional theory calculations. The dynamic behavior in MOFs also offers opportunities for the design of switchable, photo-responsive materials, and the most recent advances in their design have been described by the Gascon group.22 An exciting example of structural dynamics in MOFs is provided in the systematic study of CoII, NiII, Cd, Zn and CuII MOFs based on a bent dicarboxylate linker by the Neogi and Das groups,23 who noted a single-crystal-to-single-crystal (SCSC) transmetallation of a cadmium MOF with a copper salt.

A different application of MOFs, as precursors for carbon-based catalysts, comes from the Dao group24 at the National University of Singapore. They report highly efficient carbon composite photocatalysts by controlled oxygen-free pyrolysis of heterometallic zinc-titanium MOFs. The Kuang group25 at Xiamen University exploited pyrolysis, but under aerobic conditions, of cobalt-doped ZIF-8 to prepare ferromagnetic samples of the semiconductor ZnO.

In the context of **organic materials**, the joint contribution of the Evans and the Doonan groups26 addressed the computational design of **porous organic crystals**, whereas the Xu group27 focused on the synthesis of **covalent organic frameworks** **(COFs)** and improving their conductive properties. Another contribution on this type of materials, coming from the Bein and Medina groups,28 is an extensive computational and experimental study of how increased substitution on a model **COF** affects structure and microporosity. The Cuccia and Bohle groups29 have provided a new joint contribution on the spontaneous generation of homochirality through **Viedma ripening**, while the Perepichka group30 investigated the supramolecular ordering of difuryldiketopyrrolopyrrole, an important building block for **organic semiconductors**.

Further among the contributions dedicated to **organic or hybrid** **materials relevant for energy applications or electronic**, the Wang group31 provided a highlight of the inorganic and organic electrolytes for lithium ion batteries, the Yuan group32 at the Wuhan University prepared an extensive overview of the cutting edge carbon-based materials for use as “smart” supercapacitors, and the Ma and Zhai groups33 at Huazhong University of Science and Technology (HUST) summarised the recent developments in layered metal chalcogenides as field-effect transistors and photodetectors. As an actual example of the latter, the contribution from the Yan group34 at the Tsinghua University presents an improved design for using the metal-organic perovskite methylammonium lead iodide in a self-powered photodetector.

**Polymorphism** of organic molecules remains a topic of high interest with in the academia as well as in the pharmaceutical industry, and the Braun group35 approached the control over polymorphic behavior of a two-component crystal, 4-aminoquinaldine monohydrate, *via* a combination of experimental studies and crystal structure prediction. The Cuppen group36 conducted an elaborate theoretical study on the potential mechanisms behind the polymorphic transformation of β- to α-DL-norleucine. **Inorganic polymorphism** is the topic of theoretical work by Demichelis group,37 who investigated the effect of the length and curling on the stability of single-walled chrysotile nanotubes.

Focusing more strongly on the interplay of **supramolecular interactions** in the solid state, the White group38 addressed the architecture and synthesis of hydrogen-bonded networks made by anion-templated assembly of hexahydroxytriphenylene, the Haldar group39 revealed the formation of a biologically important motif, the tryptophane zipper, in the crystalline assembly of a synthetic tripeptide, and the Mehrotra group40 decribed the existence and interplay of *n*⋅⋅⋅π⋅⋅⋅*n* (*n*=lone pair) and S⋅⋅⋅F⋅⋅⋅S interactions in solid fluorobenzenes. An entry focusing on the design of non-crystalline organic materials was provided by the Srivastava group,41 who looked at the formation of aqueous **gels** with building blocks based on L-phenylalanine. Two contributions discussed new solid materials based on hydrogen-bonded assembly of polyoxometallates: the Pradeep group42 reports photocatalytically active materials based on self-assembly of sodium phosphotungstate with metal-organic ytterbium(III) complexes, while the Wei group43 at Tsinghua University and Peking University described a strategy for the synthesis of amino-substituted polyoxovanadates.

Several groups have focused on **single-molecule properties** in organic and metal-organic solids. Such is the joint contribution coming from the Zhou and Yao groups44 from the Changchun Institute of Applied Chemistry, who undertook the synthesis and extensive characterization of two new boron oxadiazole complexes, acting as deep blue emitters and electron transport materials. In search for new organic light-emitting diode materials (OLEDs), the Liu and Bian groups45 at Peking University reported the structures and highly emissive properties of thermally stable copper(I) binuclear complexes involving Cu2I2 luminophores. At the interface of organic chemistry and materials engineering, the Patra group46 compared a Suzuki coupling to a Schiff base condensation in generating a fluorescent organic material from a biologically relevant pyridoindole. The Wang and Gao groups47 from Peking University described two new evaporable single molecule magnets based on non-symmetrical β-diketonate complexes of dysprosium(III), while Hatcher48 describes a switchable materials based on a new palladium complex that undergoes nitro-nitrito photoinduced switching near room temperature. The Patra group49 provided the structural characterisation of four biologically active mononuclear complexes of samarium(III) and erbium(III), which can bind to DNA (as well as bovine serum albumin), thus permitting photo-induced cleavage of supercoiled into nicked circular DNA.

The rising importance of nanoparticle design and synthesis in crystal engineering is reflected by almost a dozen of contributions dedicated to properties and synthesis of nanoparticles or materials based on nanoparticles of metals or metal oxides. The Wang groups50 at Beihang University and Beijing Institute of Technology described a route to the synthesis of ZnO nanorods with controllable aspect ratio, for use in composite materials with controllable microwave absorption properties. The composite nanoparticles of CeO2 and MoS2 with core-shell architecture have been devised by the Du group51 at Xi'an Jiaotong University for use as high capacitance, energy and power density supercapacitors. The Jiang and Deng groups52 from Fudan University demonstrated the controlled assembly of siliceous vesicles using self-assembled organoammonium templates, while the Li and Zhou groups53 at Jilin University described a template-free synthesis of vanadia nanoparticles and hollow nanospheres with potential applications as cathode materials in lithium-ion batteries, by controlled thermolysis of metal-organic vanadyl glycerolate precursors: lower temperatures preferred the formation of double- and single-walled hollow architectures, while increased temperatures led to the assembly of solid nanoparticles. The Song group54 at the Korea Advanced Institute of Science and Technology developed intricate hybrid metal-metal oxide nanostructures by the assembly of silver nanoparticles onto octapodal MnO nanoparticle. Remarkably, the association between the two types of nanostructures is sufficiently stable to allow for partial etching of the silver nanostructure and replacement with gold. The synthesis of branched, and chemically complex nanostructures has been addressed by the Wang group55 from Tsinghua University who present a one-pot process for the production of trimetallic nanoparticles *via* simultaneous reduction of PtIV, PdII and NiII (or CoII) species in solution. Three-component nanowires based on Pd, Pt and Te have been synthesised by the Yu and the Liu groups,56 using tellurium nanowires as templates. A complex nanoscale architecture, composed of light upconversion nanoparticles functionalized with Pb2+-sensitive DNA fragments, and either carbon nanohorns or graphene oxide, was designed by the Sun group57 at Shanghai University as a fluorescence emission sensor for lead. A persistent challenge in nanochemistry is the reliable synthesis of ultrasmall metal nanoparticles, with diameters below 2 nm. For this special issue, the advances in this area, in the context of silver-based nanoparticles, have been summarized by the Xing group58 at the Northeast Normal University.

Overall, the topic diversity and the very large number of interesting, high-quality contributions received in response to the call for the 2016 New Talents issue does well to demonstrate the strength and diversity of modern Crystal Engineering. It also made a problem for us - because the number of articles greatly exceeded the number of contributions in a typical issue! So, we decided to publish the contributions in two consecutive issues, based on the date of manuscript acceptance. It is, therefore, our pleasure to present not one, but two, *CrystEngComm* issues demonstrating the interests, ingenuity, broadness of scope and productivity of New Talents in Crystal Engineering.