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Research Interests

Coordination Chemistry, Porous Materials, Porous Coordination Polymers (PCPs), Metal-organic Frameworks (MOFs)

Education

1971 - 1974	Kyoto University, Undergraduate course, Hydrocarbon Chemistry
1975 - 1979	Kyoto University, Graduate School, Hydrocarbon Chemistry, PhD

Professional Career

2013 - present	Director, Institute for Integrated Cell-Material Sciences, Kyoto University
2017 - present	Distinguished Professor (KUIAS)
2020 - present	Deputy Director-General (KUIAS)

Scientific Activities

2013 - 2018	Project Leader of ACCEL, JSPS
2013 - 2018	Project Leader of Grant-in-Aid for Scientific Research for Specially Promoted Research "Chemistry of Hierarchical Coordination Space"
2012 - 2018	Project Leader of ACT-C, JSPS "Synthesis of porous coordination-based catalyst for conversion of carbon dioxide to methanol"

Honors

2017	Chemistry for the Future Solvay Prize
2018	Grand Prix of the Fondation de la Maison de la Chimie
2016	Japan Academy Prize
2011	The Medal with Purple Ribbon (The Japanese Government)

Publications

1. "Design and control of gas diffusion process in a nanoporous soft crystal", C.Gu, et al., Science, 2019, 363, 387-391.
2. "Highly responsive nature of porous coordination polymer surfaces imaged by in situ atomic force microscopy", N.Hosono, et al., Nature Chemistry, 2018, 11, 109-116.
3. "Self-Accelerating CO Sorption in a Soft Nanoporous Crystal", H.Sato, et al., Science, 2014, 343, 167-170.
4. "Localized cell stimulation by nitric oxide using a photoactive porous coordination polymer platform", S.Diring, et al., Nature Commun. 2013, 4, 2684-2691.

New Dimensions of Porous Coordination Polymers/ Metal-Organic Frameworks

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The recent advent of porous coordination polymers (PCPs) or metal-organic frameworks (MOFs) as new functional microporous materials, have attracted the attention of chemists and physicists due to not only scientific but also application interest in the creation of unprecedented regular nano-sized spaces and in the finding of novel phenomena [1]. For the sake of consistency, we will refer to these porous materials as MOFs. Beyond the robust frameworks of MOFs, we discovered the essential attribute of MOFs that is porous structural flexibility, dissimilar to the conventional porous materials. Porous crystals with soft properties are collectively named "soft porous crystal (SPC)", and flexible MOFs are a class of SPC [2]. Flexible MOFs have a great potential for gas science & technology [3,4], focusing on energy and environmental, and bio active gases. High-efficiency separation technology, different from conventional ways, is essential for low-energy separation of gas resources, flue gases, air, pollutant gases and other industrial materials. Regulation of physiological functions of cells and tissues by spatiotemporally controlled release of biologically active gases is also important[5]. The future aspects will also be discussed [6,7].

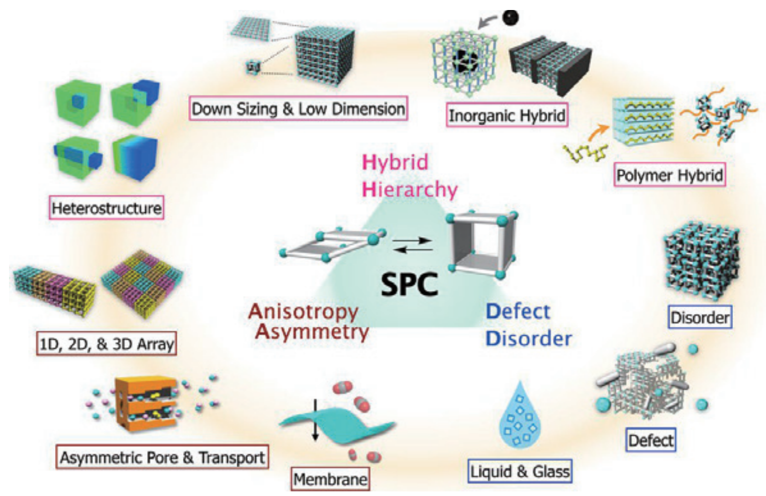

Figure 1. Different aspects of MOFs obtained from SPCs[7].

References

[1] S.Kitagawa, et al., Angew. Chem.Int. Ed., 2004, 43, 2334. Review article
[2] S.Horike, et al., Nature Chem., 2009,1,695. Review article
[3] S.Kitagawa, Angew.Chem.Int.Ed., 2015, 54,10687. Editorial
[4] S.Kitagawa, Acc.Chem.Res., 2017,50,514. Commentary
[5] S.Diring, et al.,Nature Commun., 2013, 4, 2684.
[6] S.Kitagawa, et al.,Angew. Chem.Int. Ed., 2020, 59, 6652. Review article
[7] S.Kitagawa, et al.,Angew. Chem.Int. Ed., 2020, 59, 15325. Review article