

## New Generation of Porous Materials-Soft Porous Crystals

Susumu Kitagawa

Institute for Integrated Cell-Material Sciences (iCeMS), Kyoto University, Katsura, Nisikyo-ku, Kyoto, 615-8510

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.<sup>1</sup> In 1998, porous coordination polymers were classified into three categories — first, second and third generations, predicting the presence and importance of the softness of crystals.<sup>2</sup> We have discovered flexible porous frameworks, which respond to specific guests, dissimilar to the conventional porous materials.<sup>3</sup> We describe them as a new category of materials, “soft porous crystals (SPC)”. SPCs herein are defined as solids possessing both highly ordered framework and structural transformability. SPCs provide us with various unique functions on confinement and recognition of guest molecules, and responsiveness to chemical and/or physical stimuli. They are listed in Figure 1; 1) efficient reaction vessels, which allow controlled living radical polymerization as well as stereo-regulated polymerization of substituted acetylenes.<sup>4,5</sup>

2) bidirectional chemo-switching SPC with the aid of spin crossover properties<sup>6</sup>, 3) a highly

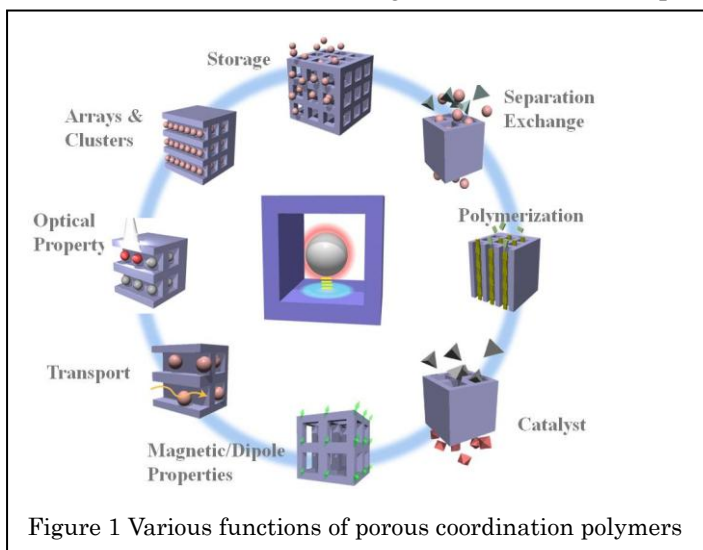


Figure 1 Various functions of porous coordination polymers

proton conductive aluminum PCP having one-dimensional imidazole aggregate at high temperature.<sup>7</sup> 4) “reactive open-shell atoms (ROSA) in the pores; a crystalline porous material with the pore surface regularly decorated with highly reactive ‘bare’ nitrenes that are photonicly generated from stable ‘dormant’ precursors at will.”<sup>8</sup>

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