

이산화탄소 포집 및 분리를 위한 구조 조절된 MOF 개발(Carbon Dioxide Capture and Separation of Well-Tailored Metal-Organic Frameworks)

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For CO₂ sorption and separation, we have developed synthesis methods of novel nanoporous materials such as flexible metal-organic frameworks (MOFs) and amine-functionalized MOFs. In this talk, we will present synthetic strategies that exploit a flexible MOF (flexMOF) constructed with Ni(II) macrocyclic complexes possessing flexible pendant arms and a tetracarboxylate ligand. We demonstrated the direct capture of these gate-opening and breathing phenomena, triggered by CO₂ molecules, in a well-designed flexible MOF composed of rotational sites and molecular gates. Combining X-ray single crystallographic data of a flexible MOF during gate opening/closing and breathing with in situ X-ray powder diffraction results uncovered the origin of this flexibility. In addition, we introduce a one-step construction of a MOF possessing covalently tethered alkylamine groups without postsynthetic modification. In this system, only crystal size reduction led to much faster and greater CO₂ uptake at low pressures.