

나노다공성 재료 합성 연구단

Center for Ordered Nanoporous Materials Synthesis



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포항공대 환경공학부
2018. 01. 09.

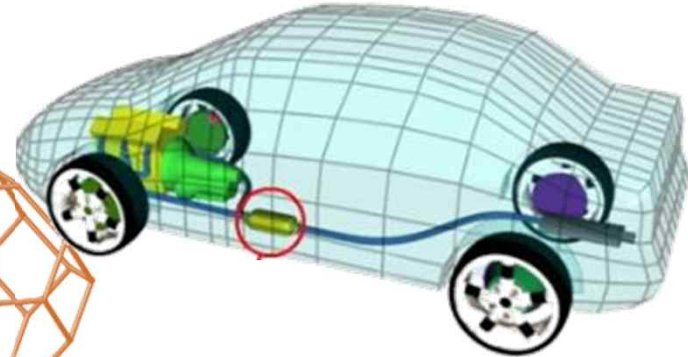


나노다공성 재료와 용도

Petrochemical production



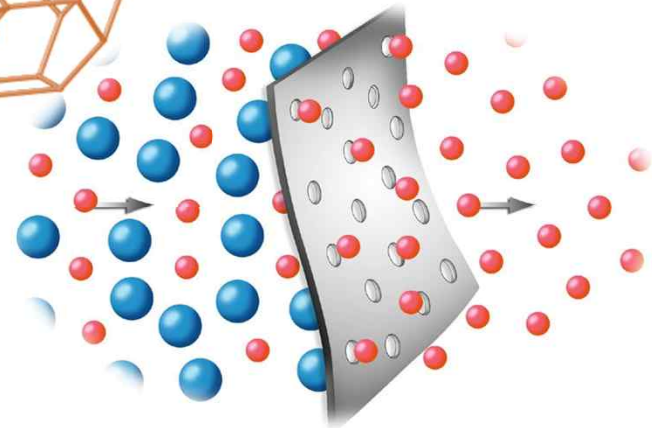
Catalytic converter



Zeolite



Gas separation

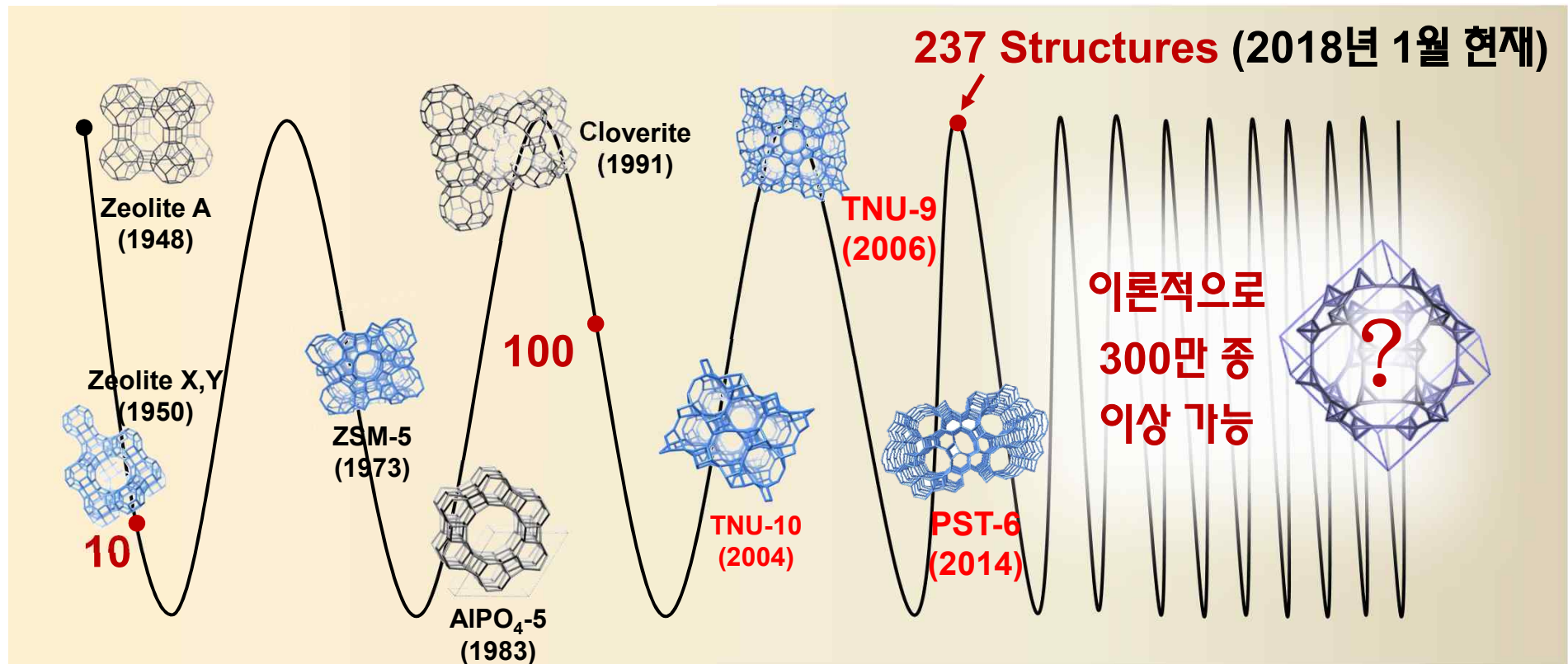


Bio diesel

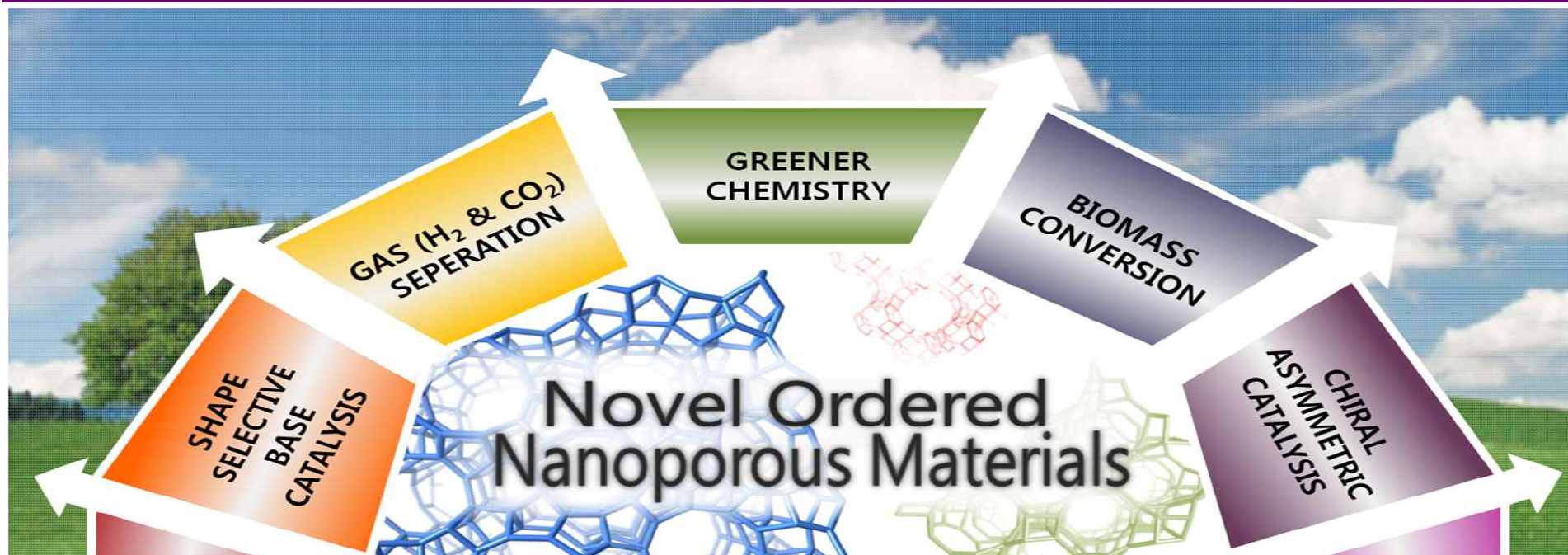


How Many Different Zeolites can be Synthesized?

<http://www.iza-structure.org>

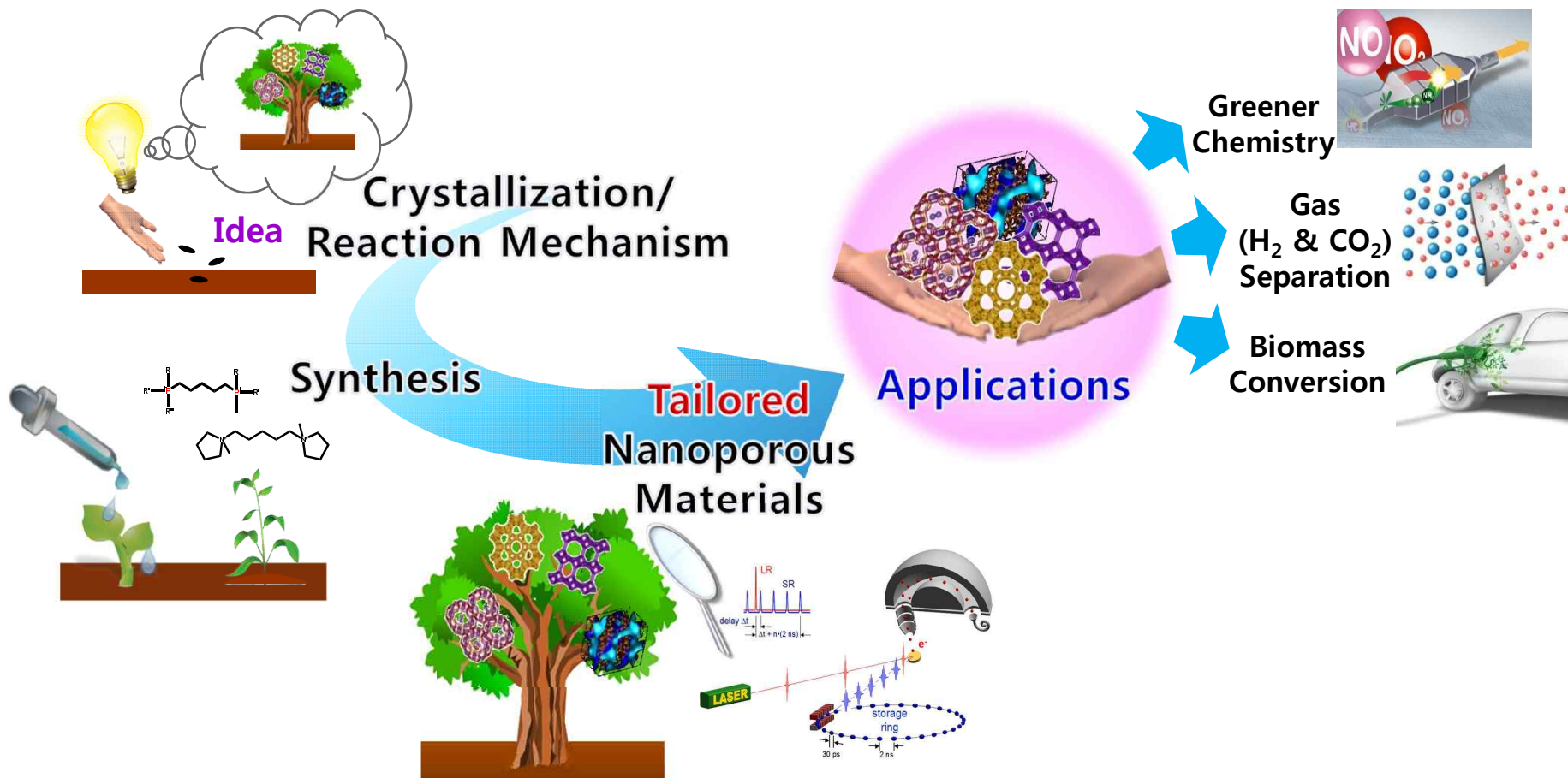


연구단 최종 연구 목표

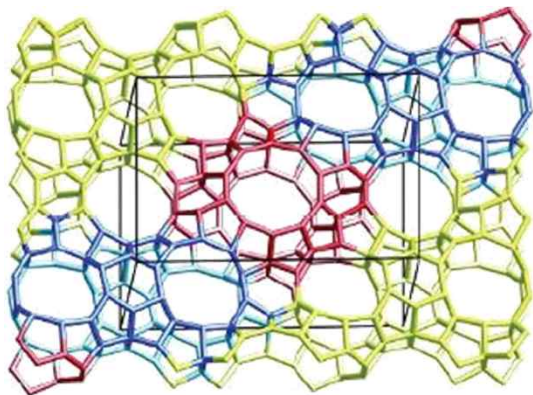


- 나노다공성 재료 디자인을 위한 **결정화 메커니즘의 근원적 이해**
- 미래사회 기술선도를 위한 **새로운 나노다공성 재료 합성 및 구조결정**
- 새로운 나노다공성 재료를 이용한 **현 기술의 근본적 한계 극복** 및 수소/이산화탄소 분야 미래원천기술 개발

연구 개략도

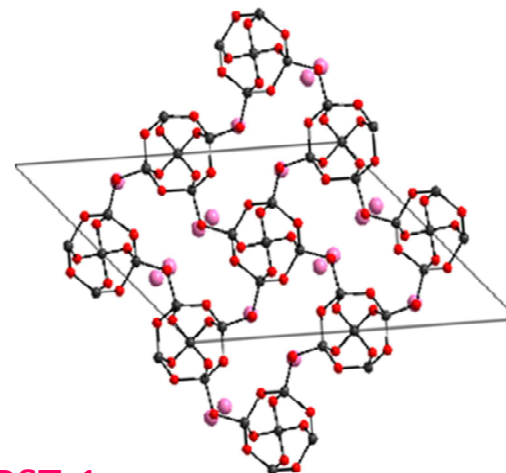


Our Representative Materials



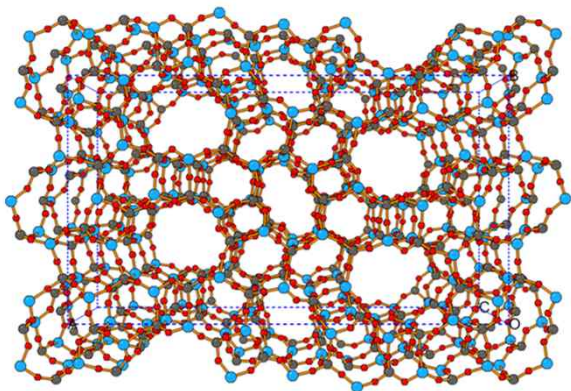
TNU-9

(*Nature*, **2006**; *J. Am. Chem. Soc.*, **2007**)



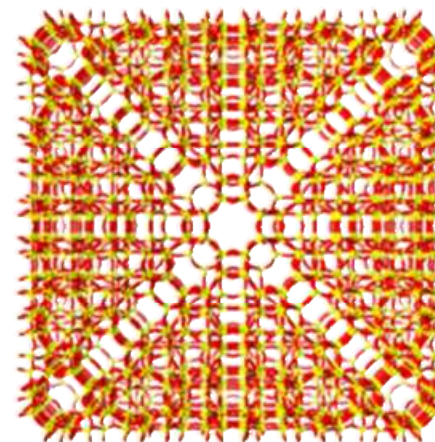
PST-1

(*Angew. Chem. Int. Ed.*, **2009**)



PST-6

(*Angew. Chem. Int. Ed.*, **2014**)



PST-20

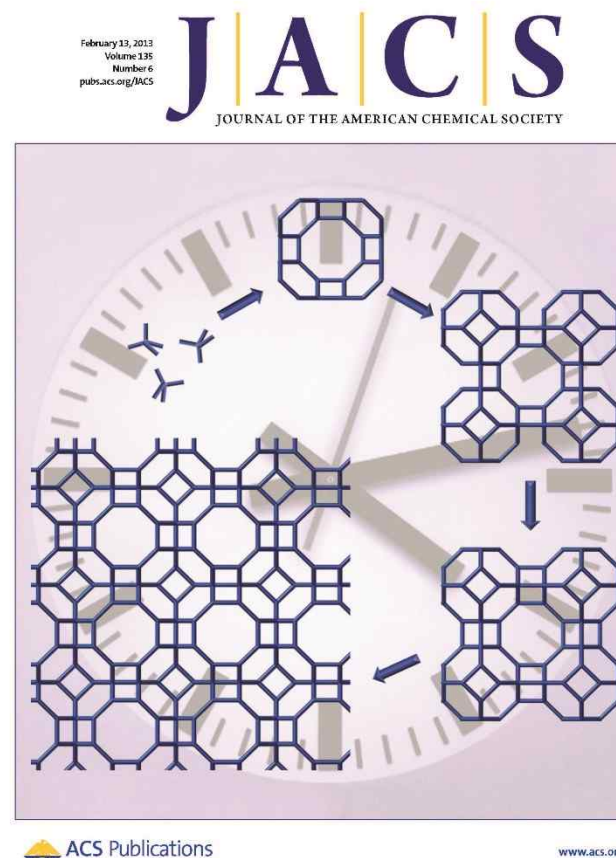
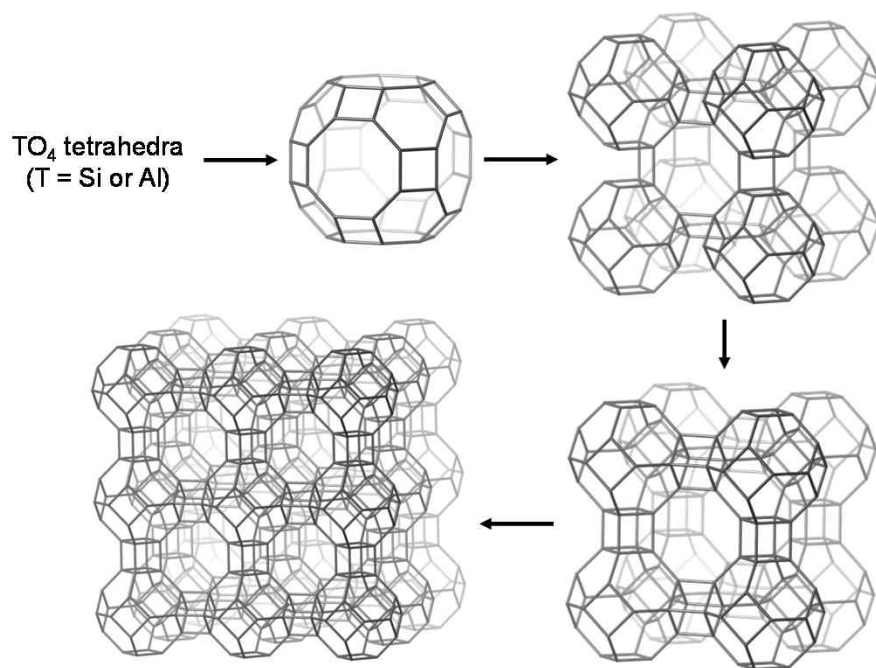
(*Nature*, **2015**)



Zeolite Crystallization Mechanisms

Formation Pathway for LTA Zeolite Crystals

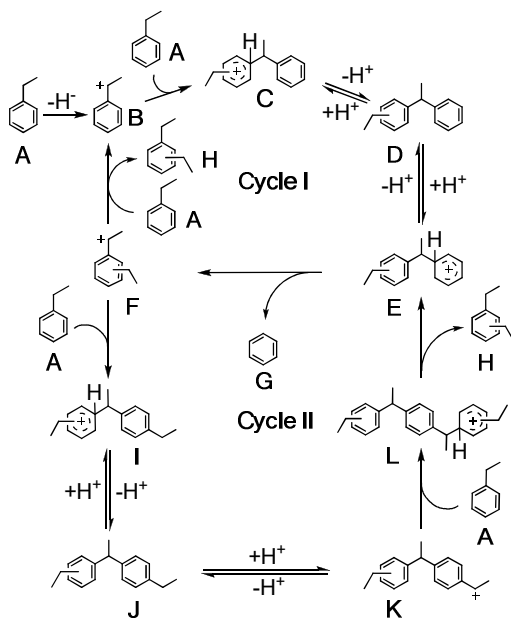
The large *lta*-cage is the origin of the nucleation of high-silica LTA zeolite!!!



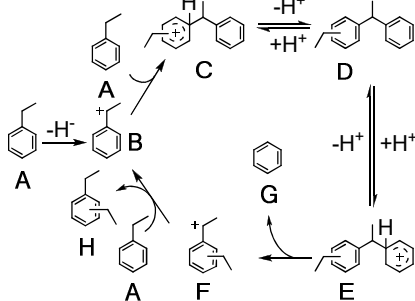
Mechanistic Investigations of Chemical Reactions

Ethylbenzene Disproportionation

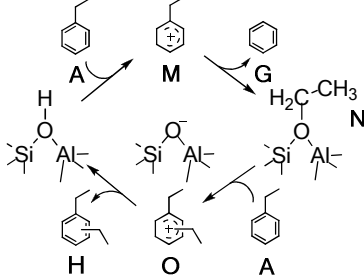
I. Dual-cycle DPE-mediated pathway



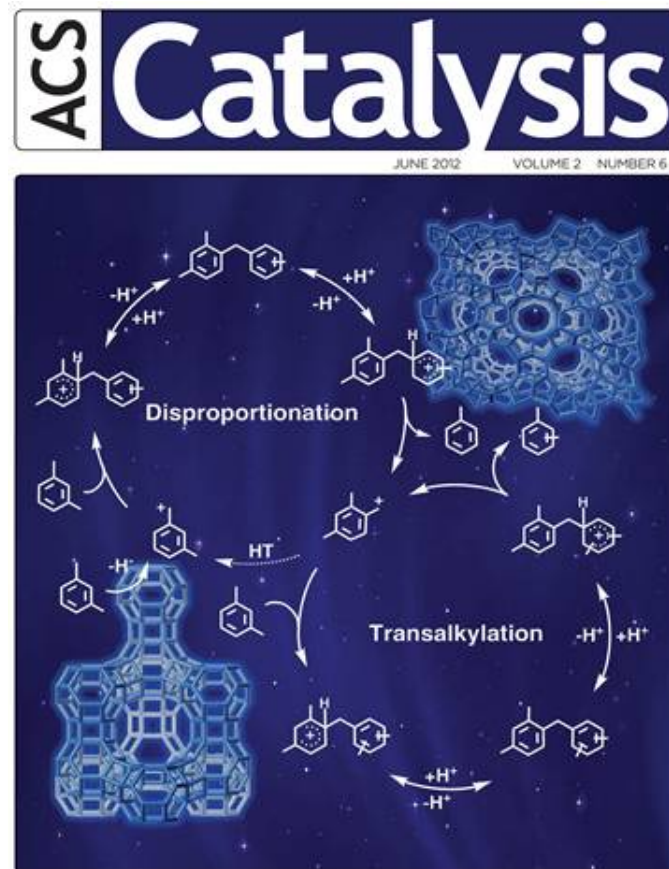
II. Bimolecular DPE-mediated pathway



III. Monomolecular ethyl-transfer pathway



m-Xylene Transformation



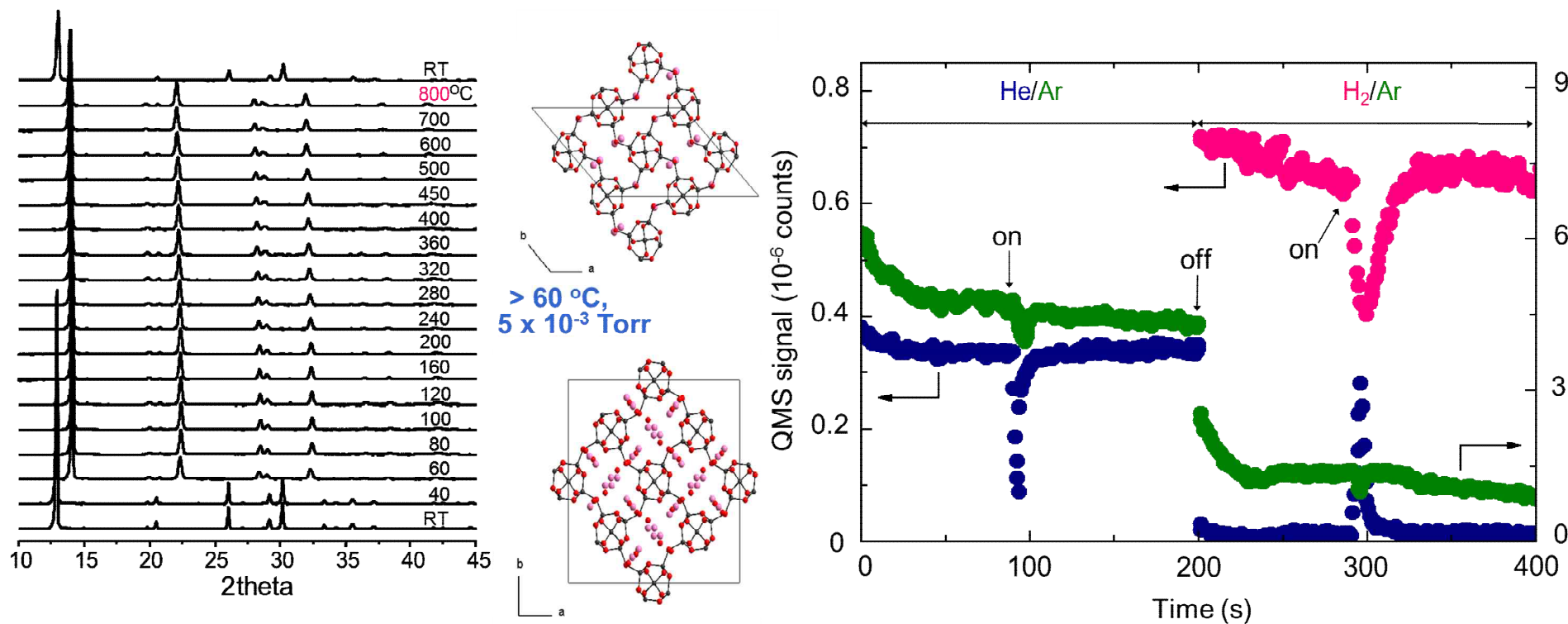
J. Phys. Chem. C, 2010;
ACS Catal., 2012



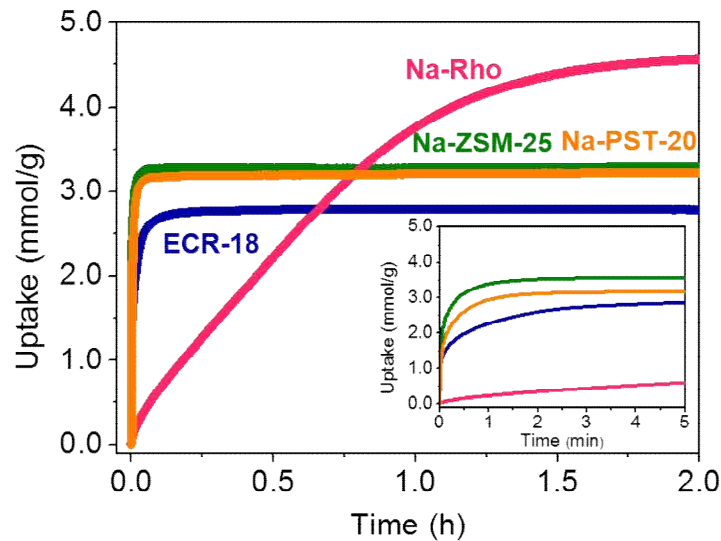
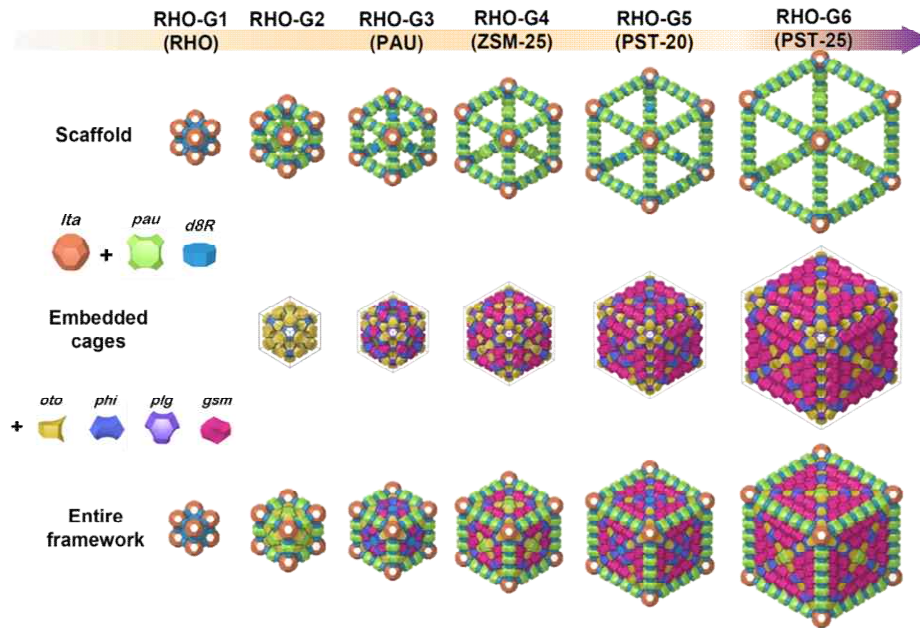
Gas (H_2 & CO_2) Separation Based on Zeolites

Angew. Chem. Int. Ed., 2009

PST-1: The 1st Material that Directly Adsorbs H_2

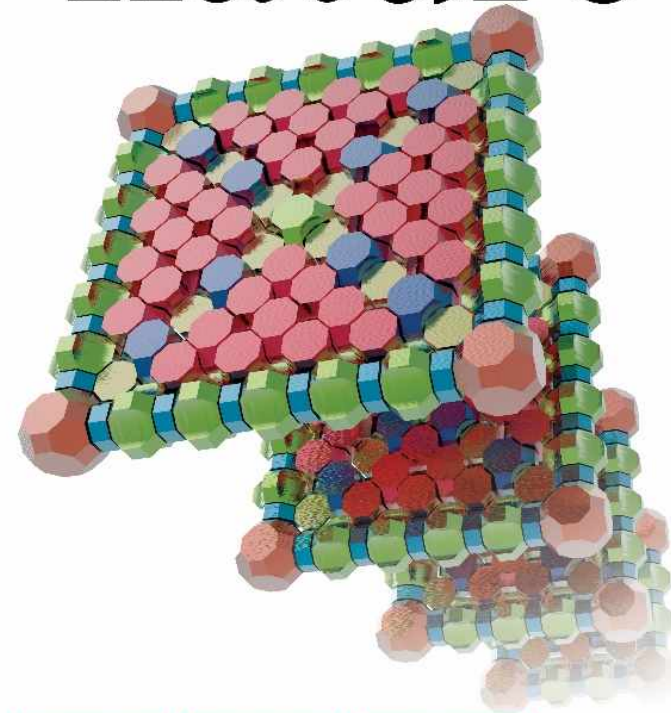


Embedded Isorecticular Zeolite Structures (EIZSs)



Peng Guo, Jiho Shin, Alex G. Greenaway, Jung Gi Min, Jie Su, Hyun June Choi, Leifeng Liu, Paul A. Cox, Suk Bong Hong, Paul. A. Wright & Xiaodong Zou

nature



GREEN SYNTHESIS
CHEMISTRY IN
THE SLOW LANE
*Let time do all
The hard work*
PAGE 20

NEUROSCIENCE
REDEFINING
FEAR
*Have we got it wrong on
the nature of anxiety?*
PAGE 24

MATERIALS
DESIGNER
MAGNETS
*Inducing magnetism in
Copper and manganese*
PAGE 42 & 69

NATURE.COM/NATURE
6 August 2015 £10
Vol. 524, No. 7563

Nature, 2015



나노다공성 재료 합성 창의연구단

- 총 연구기간: 2012. 09. 01 – 2021. 08. 31 (108 개월)
- 2단계 연구기간: 2015. 09. 01 – 2018. 08. 31 (36 개월)
- 연구비: 852,000 천 원/년



연구 환경

Man power	4 Post doc., 14 PhD students, 4 MS students, 1 Staff
Main equipments	5 Hoods 23 Rotating synthetic ovens 1 Powder XRD machine 1 TGA/DTA 2 GC-MS 1 Mass spectrometer 2 Pore size analyzer 1 PCT 2 FT-IR spectrometer 7 Reaction apparatuses with on-line GC
Free access	SEM



Thank you for your attention!

Q & A

