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# Investigation of metal-organic framework materials and zeolites for advanced gas absorption mechanism

Combining synchrotron radiation with various sample environment setups, such as capillary flow cell, we are able to understand the mechanism of gas absorption properties from MOFs and zeolites. In-situ powder X-ray diffraction (PXRD) measurements have been conducted to discover a “molecular trapdoor” mechanism for exclusive gas discrimination, which is demonstrated as an unusual operating regime for a chabazite zeolite in which the adsorption selectivity for N2 over CH4 inverts from being more selective for N2 at 253 K, to becoming less selective with increasing temperature and eventually becoming selective for CH4 over N2 above 293 K [1]. PXRD also demonstrates it as an outstanding tool to reveal the novel metal organic framework (MOF) structures and monitor the progress of a new acid solvent synergistic ligand exchange (ASSLE) synthesis method. PXRD shows the case of Zn(BPDC)(BPP) (BPDC = 4,4’-biphenyldicarboxylate, BPP = 1,3-Bis(4-pyridyl)propane) incorporated an exotic flexible-ligand into a rigid pillar-layered MOF structure via structural rearrangement during ligand exchange, creating structural flexibility in the daughter material [2]. The adsorption properties of the daughter material suggest a superior gas separation performance to the parent material.

[1] Shang J., Li G., Gu Q., et al. Chem. Commun., 50, 4544, (2014)
[2] He Y., Shang J., Gu Q., et al. Chem. Commun. 51, 14716, (2015)

## Keywords or phrases (comma separated)

PXRD, gas absorption

## Are you a student?

No

## Do you wish to take part in</br>the Student Poster Slam?

No

## Are you an ECR? (<5 yrs</br>since PhD/Masters)

No

## What is your gender?

Male

**Primary author(s) :** Dr GU, Qinfen (Australian Synchrotron)

**Co-author(s) :** Dr BRAND, Helen (Australian Synchrotron.); Dr SHANG, Jin (The University of Melbourne); Dr KIMPTON, Justin (Australian Synchrotron); Prof. WEBLEY, Paul (The University of Melbourne); Dr HE, Yingdian (Melbourne university)

**Presenter(s) :** Dr GU, Qinfen (Australian Synchrotron)

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