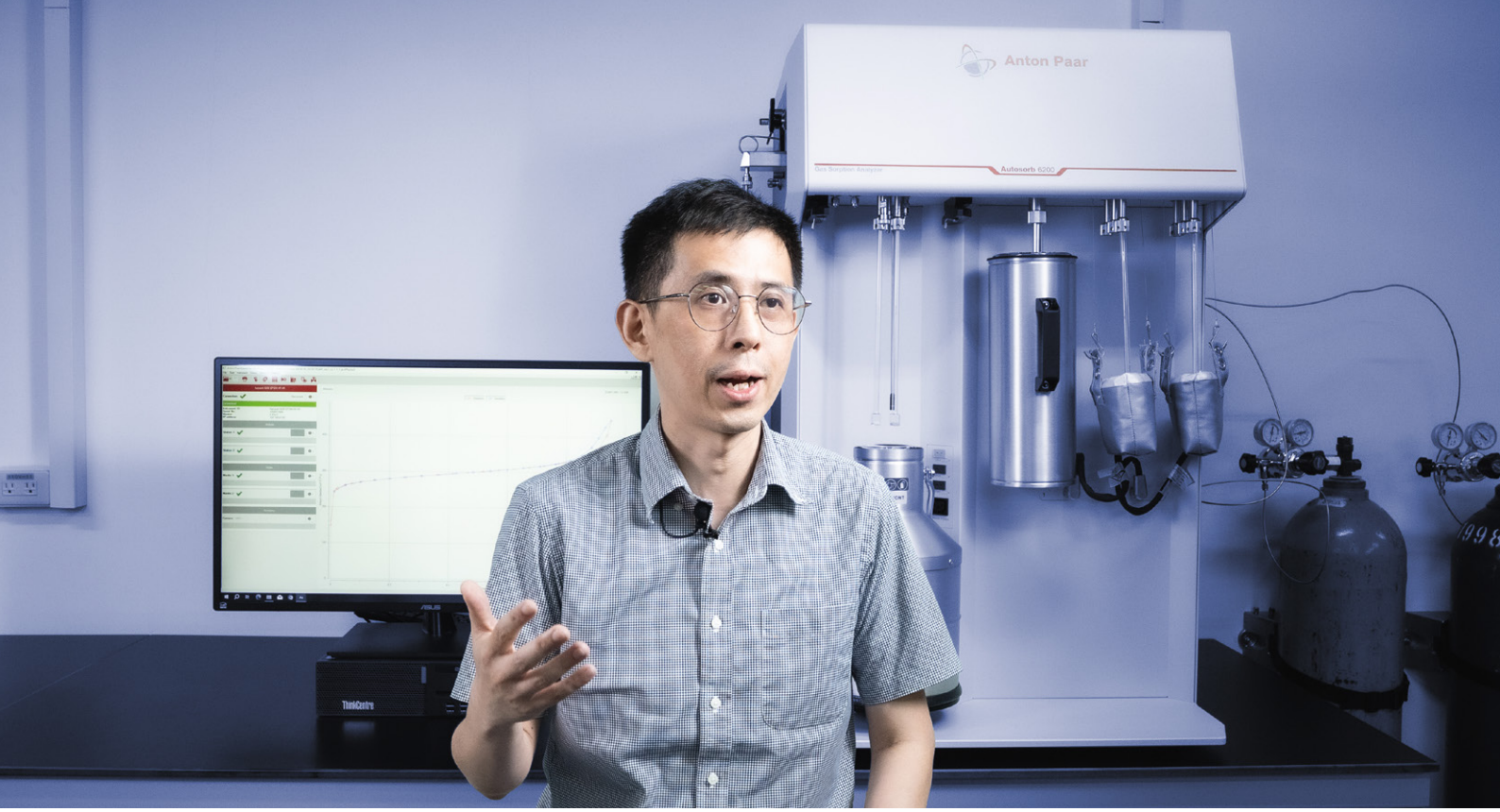
Anton Paar

Pore Size Precision:
National Taiwan University Drives MOF Research with Autosorb 6200

Chemical Research



→ Professor Dun-Yen Kang researches microporous materials and their applications in carbon capture.

Accurate pore size measurement using Anton Paar's Autosorb 6200 is helping Professor Dun-Yen Kang and his team accelerate research into MOFs for carbon capture and gas separation.

Professor Dun-Yen Kang from the Department of Chemical Engineering at National Taiwan University, and joint research fellow at the Center for Condensed Matter Sciences, has been working in the field of microporous materials for more than 15 years.

His current research focuses on metal-organic frameworks (MOFs) and their applications in carbon capture.

This involves processing MOFs into powders or membranes to separate carbon dioxide from gases such as nitrogen.

Because MOF pores are extremely small – usually less than one nanometer – Professor Kang uses nitrogen adsorption to precisely measure their size and adsorption capacities.

It's a task requiring an exceptional degree of accuracy.

"We often replace different organic ligands to optimize gas adsorption efficiency or membrane selectivity," he explains.

"Sometimes, even slight variations in functional groups can cause structural distortions and affect pore size."

To achieve the most precise measurements, Professor Kang and his team use Anton Paar's Autosorb 6200 physisorption analyzer.

→ Professor Kang and his team use Autosorb 6200 to accurately measure pore size and adsorption capacity.

"Autosorb offers several key advantages," he says.

"First, it can achieve sufficiently low pressure levels, with P/P_0 values down to 10^{-7}. The lower the pressure, the smaller the pore size limit that can be detected, which is highly beneficial for our research."

The instrument also allows simultaneous measurements with up to three ports – each reaching the same low-pressure range – which has significantly accelerated his team's progress.

Beyond nitrogen adsorption, Autosorb 6200 supports other gases such as carbon dioxide and methane.

"This enables us to directly obtain CO_2 adsorption isotherms, making the instrument versatile enough to meet multiple research needs with just one system," Professor Kang says.

But the support he receives from Anton Paar is just as valuable as the technology itself.

"The Anton Paar Taiwan team provides us with professional and comprehensive technical support, and has even arranged exchanges with senior experts from headquarters. I feel that they are truly committed to supporting both academia and industry in Taiwan."

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Dun-Yen Kang, Professor at the Department of Chemical Engineering at National Taiwan University

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Professor at the Department of Chemical Engineering
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Instruments: Autosorb 6200

Measured parameters: BET surface area, active area, and pore size distributions

Samples: Metal-organic frameworks (MOFs) in powder or membrane form

Pressure: Range: $2x10^{-5}$ to 1,100 Torr ($2.6x10^{-8}$ to 0.997 P/P_0 for N_2 77K)
Resolution (MP): $2x10^{-5}$ Torr ($2.6x10^{-8}$ P/P_0 for N_2 77K)
Resolution (XR): $1x10^{-6}$ Torr ($1.3x10^{-9}$ P/P_0 for N_2 77K)

Sample throughput: Simultaneous analysis of up to three gases at three temperatures