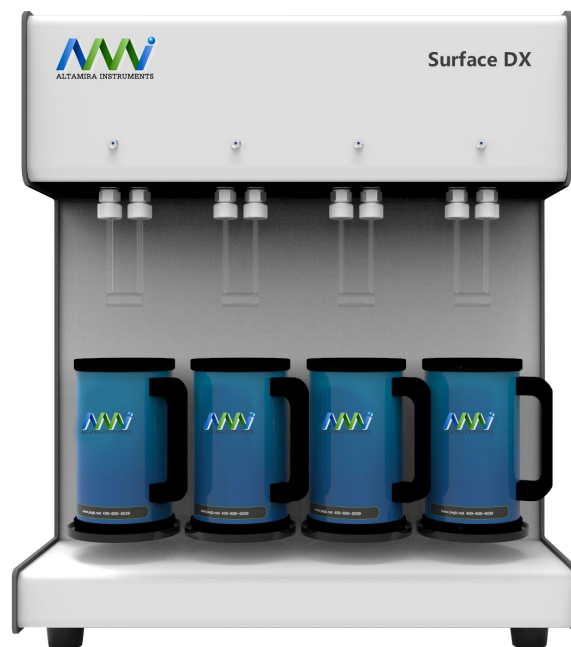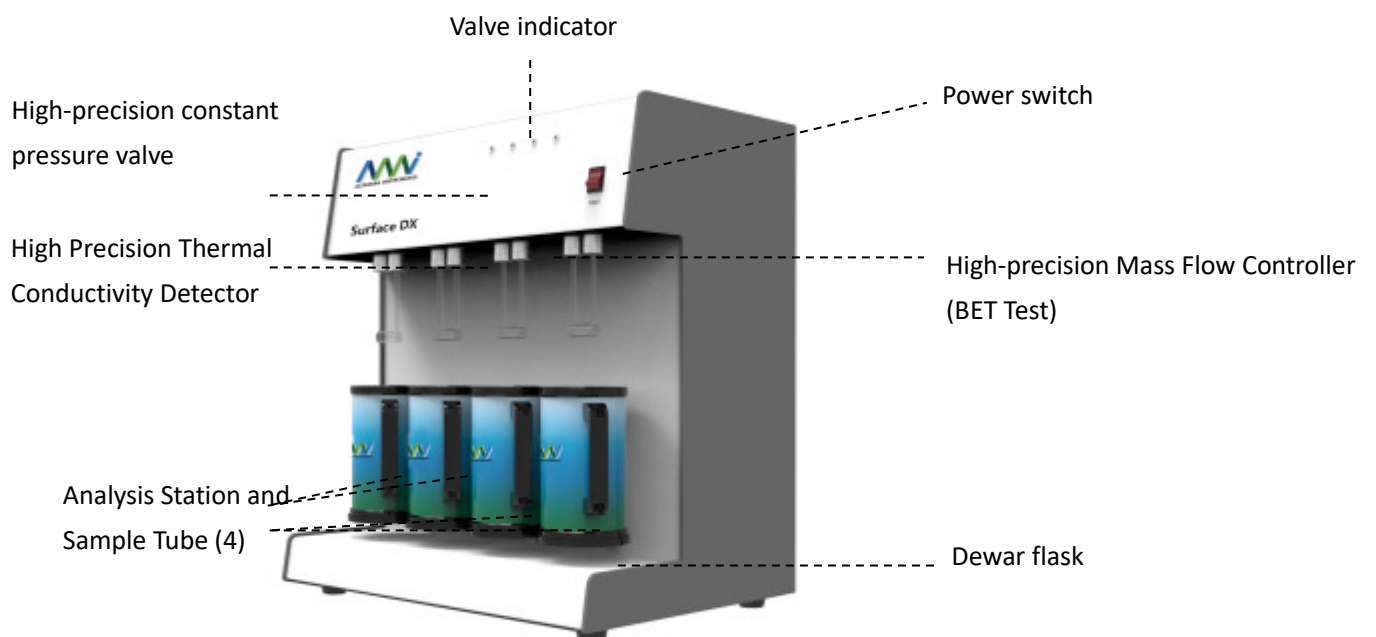# Dynamic Nitrogen Adsorption BET Surface Area Analyzer

AMI Surface DX

The AMI Surface DX is a fully automated gas sorption analyzer with four parallel operating analysis stations for rapid BET surface area determination. The analyzer operates without a vacuum system but works with the dynamic principle (flow method). Both Single point-BET and Multipoint-BET measurements can be carried out reliably and in very short times suitable for production and quality control. Use of reference comparison methods keeps the detection time of adsorption peaks extremely short.

Valve indicator

High-precision constant pressure valve

High Precision Thermal Conductivity Detector

Power switch

High-precision Mass Flow Controller (BET Test)

Analysis Station and Sample Tube (4)

Dewar flask

Features

The analysis is based on the adsorption peaks. Using this method avoids test deviation caused by the incomplete desorption of samples. It's is also suitable for measurements of low surface area materials.

Sample Preparation Device

The external sample preparation device (option) comes with four-degas stations that can remove adsorbed contaminants from surface and pores of sample. Temperature can be set and controlled from ambient to 400 °C.
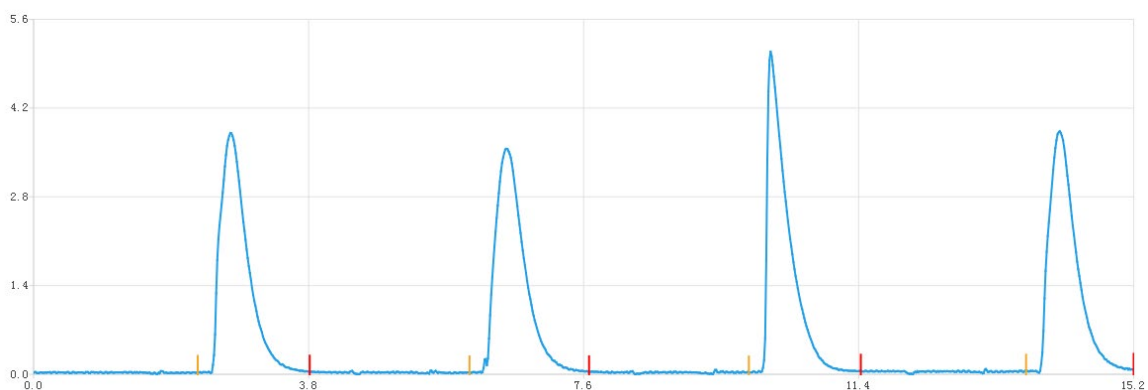

Low Form Dewar flask

Long-life and high volume (1L) Dewar flasks assures a constant thermal profile along the length of sample tubes during experiment.

Adsorption Peak

Adsorption peaks are very sharp, with no discernable tail. time only needs about 15 minutes.

The comparative test of four samples at one

Anti-contamination

A built-in anti-contamination system is used to prevent samples from being blown into the instrument pipeline, ensuring proper operation of the instrument.

Calibration System

Using valves to automatically control the calibration system

Nitrogen Partial Pressure

Using 70ml/min and 30ml/min precision mass flow controllers to automatically adjust the partial pressure of nitrogen in BET surface area test.

Analysis Station

All analysis ports (4) can be controlled individually achieving high efficiency and ensuring repeatable test results. The repeatability of test results is better than $\pm$ 1.0%.

## Convenient Operation and User-friendly Design

Operation of Surface DX:

Adsorption process is dynamically displayed on test interface. It's easy to monitor the flow of nitrogen and helium real time.

External sample preparation devices equipped with a miniature vacuum pump and heating furnace; temperature of furnace is from ambient to 400 ± 1ºC. After the sample is transferred from the sample degassing/prep device, a test on the surface Dx can easily be started.
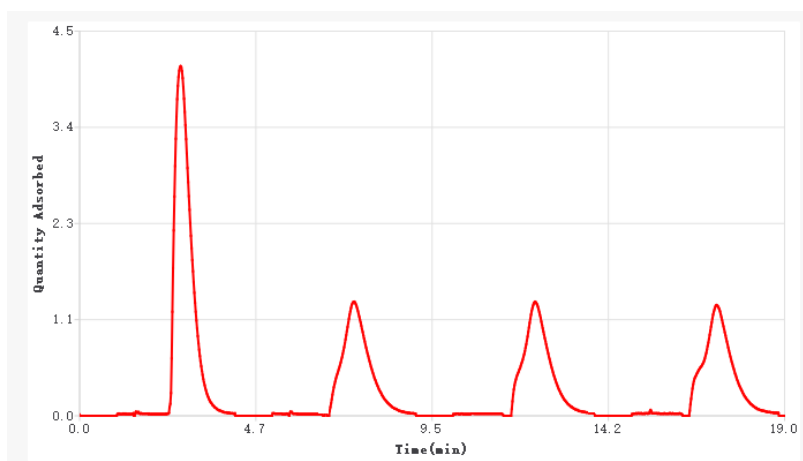
Specific examples
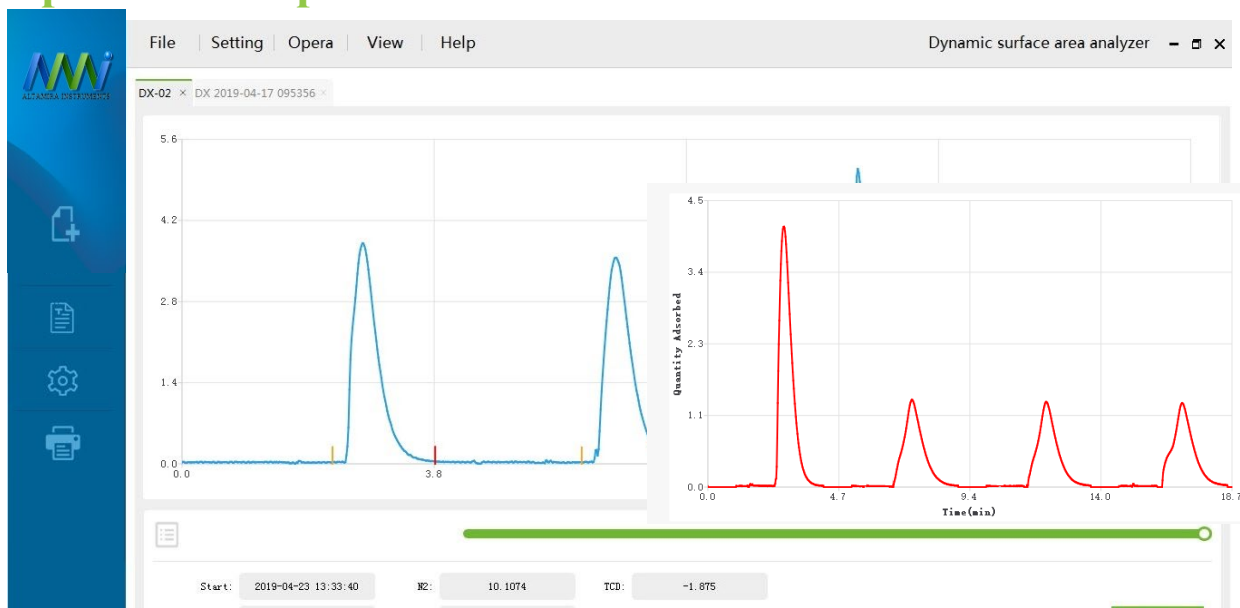
Number	Sample	Mass(g)	Peak Area	Surface Area(m2/g)
1	Reference	1.0442	858692	9.100
2	NC-H3M#031	3.9968	440288	1.219
3	NC-H3M#046	3.8427	422557	1.217
4	NC-H3M#049	4.0343	450965	1.237

Number	Sample	Mass(g)	Peak Area	Surface Area(m2/g)
1	Reference	1.0213	836140	9.100
2	NC-H3M#031	3.9968	437848	1.218
3	NC-H3M#046	3.8427	419070	1.212
4	NC-H3M#049	4.0343	436612	1.203

Multi-Points BET

BET Surface Area: 9.13864 m2/g
Slope: 0.47263
Y-Intercept: 0.00446 cm3/g STP
Vm: 2.09602 cm3/g STP
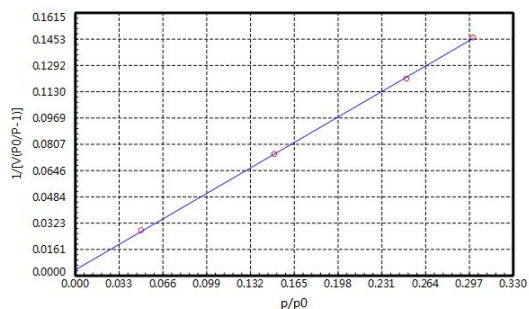C: 106.89248
Correlation Coefficient (Cc): 0.99992

BET Surface Area Plot
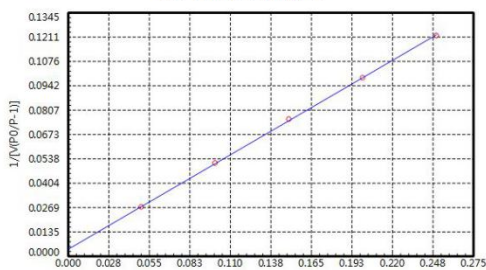
ID	p/p0	V(cm3/g STP)	1/[V(Po/P-1)]
1	0.05000	1.90429	0.02764
2	0.10000	2.14198	0.05187
3	0.15000	2.31909	0.07609
4	0.20000	2.52773	0.09890
5	0.25000	2.72596	0.12228

BET Surface Area: 9.14797 m2/g
Slope: 0.47243
Y-Intercept: 0.00418 cm3/g STP
Vm: 2.09816 cm3/g STP
C: 114.10706
Correlation Coefficient (Cc): 0.99988

BET Surface Area Plot

ID	p/p0	V(cm3/g STP)	1/[V(Po/P-1)]
1	0.05000	1.87720	0.02804
2	0.15000	2.35269	0.07501
3	0.25000	2.75046	0.12119
4	0.30000	2.91954	0.14679

Specification

Type	Surface DX	Surface DA
Test principle	Low temperature nitrogen adsorption, dynamic method	
Distinction	adsorption technique	desorption technique
	Recording adsorption data, same as static volumetric method. Separate analysis stations are suitable for testing sample with low surface area (< 10 m^2/g).	Recording desorption data, analysis stations are not mutually independent. It is not suitable for accurately measuring samples with low surface area (less than 10 m^2/g) – broad peak.
Test Method	Reference method; Single point BET; Multi-point BET.	Reference method; Single point BET; Multi-point BET.
Adsorbate and Carrier Gas	High purity nitrogen (99.999%); High purity helium (99.999%).	
Range of P/P_0	0.05~0.3	
Range of BET Surface Area	0.01 m^2/g to the infinity; (It is not suitable for detecting micropore materials).	
Repeatability	Typically better than $\pm$1.0% (carbon black)	Typically better than $\pm$1.5% (carbon black)
Analysis Stations	4	4
Efficiency	5 min per sample (reference method); 25 min per sample (multi-point BET)	9 min per sample (reference method); 30 min per sample (multi-point BET)
Overall Dimension	Depth: 24'', Width: 18'', Height: 27''; Weight: 110lbs	
Ambient Temperature	15-40 ^{o}C	
Relative Humidity	30%-60%	
Electrical Supply	110220VAC±20V, 50-60 Hz, maximum power300 W;	

Applications

Applied Field	Typical Materials
Material Research	ceramic powder, metal powder, nanotube
Chemical Engineering	carbon black, amorphous silica, zinc oxide, titanium dioxide
New Energy	lithium cobalt, lithium manganate
Catalytic Technologies	active alumina oxide, molecular sieve, zeolite

ALTAMIRA INSTRUMENTS

Altamira Instruments

info@altamirainstruments.com

www.altamiraisntruments.com