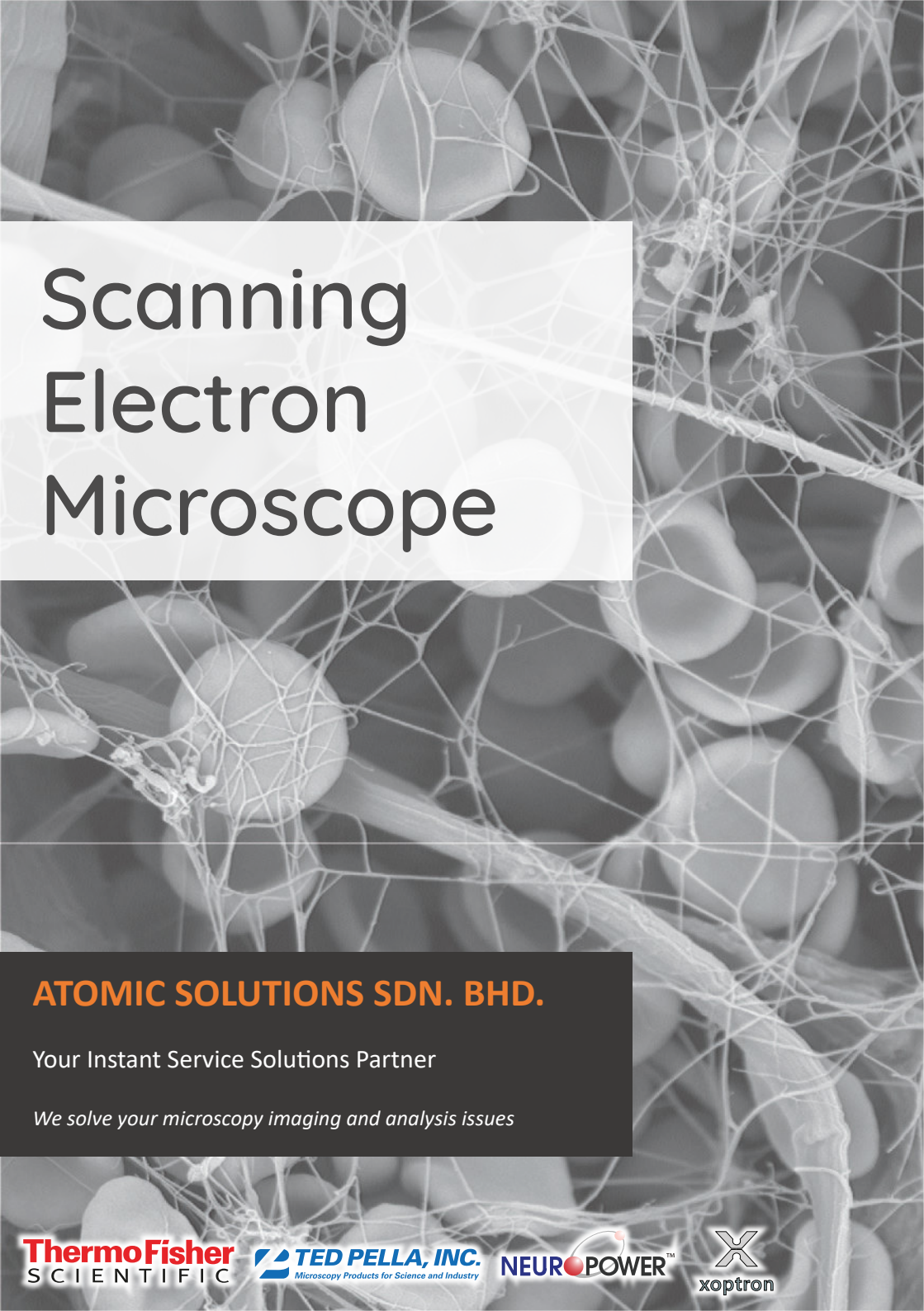

Scanning Electron Microscope

ATOMIC SOLUTIONS SDN. BHD.

Your Instant Service Solutions Partner

We solve your microscopy imaging and analysis issues

ThermoFisher SCIENTIFIC

TED PELLA, INC. Microscopy Products for Science and Industry

NEURONPOWER™

xoptron

Introduction

Atomic Solutions Sdn. Bhd. is established in year 2012. HQ located at Johor Bahru. We focus on the Microscope products and specializing in Quality Assurance, Failure Analysis, Microscopy Imaging and X-Ray Imaging solutions for the manufacturing and R&D sector. We focus on the industrial market such as Hard disk, Semiconductors, Electronics, PCBA, Laboratory, General Industrial and University (Education). Our direction is clear, to promote the solution for our customers and provide value proposition, continuous service & support and maintain long-term commitment to our customers and suppliers. We always ensure our customers continuously grow with our supplier products & expertise providing practical innovation and beneficial results and expectation.

Our Vision

Atomic Solutions Sdn. Bhd. is established with a group of technical and experienced engineers well versed in the industrial expectation and requirements. We create the culture of Mutual Cooperation, Trust & Capabilities for Lasting Success, Progress & Achievement between Atomic Solutions Sdn. Bhd, Customers & Suppliers.

Our Mission

To be the instant solutions provider that continue to grow in knowledge, excel in innovative technology and application hence providing our best possible solutions.

We focus on 3 things:

1) Our customer's requirements
2) Our innovative solutions & completeness
3) Our supplier's support & expertise

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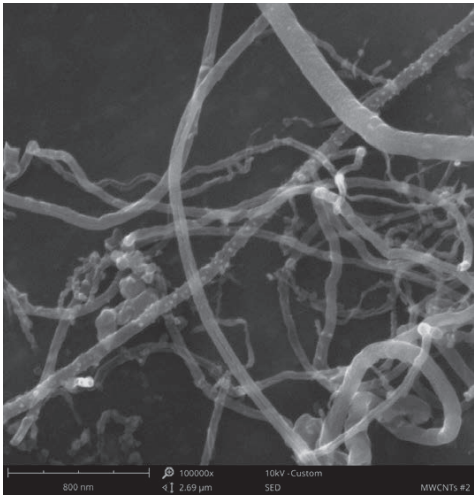
The Phenom Pharos is a desktop SEM with a FEG source that makes crisp, high-brightness images



Phenom Pharos
Multiwall Carbon nanotubes
10 kV SE image @ 100.000x

Floor model Tungsten
Multiwall Carbon nanotubes
10 kV SE image @ 100.000x

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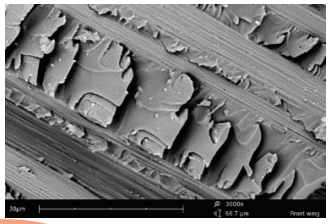
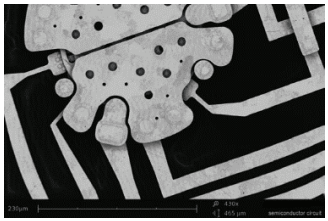
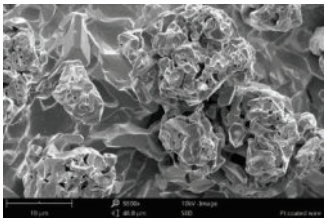
ThermoScientific Desktop SEM

Phenom Desktop SEM provides high-resolution imaging, best imaging results in its class, offers the market's fastest loading and imaging time. The very reliable autofocus and automated source alignments make this the most user-friendly system on the market. Fast identification of different chemical elements can be done through integrated Energy Dispersive Spectrometer (EDS).

	Pure	XL Gen2	Pro/ProX	Pharos
Color Image	27x	3 - 16x	20 - 134x	20 - 134x
Magnify Range	160 - 175,000x	160 - 200,000x	160 - 350,000x	200 - 1,000,000x
Acc.Voltage	5, 10 kV	5, 10, 15, 20.5 kV		
Resolution	< 15 nm	< 10 nm	< 6 nm	< 2.5 nm
Electron Source	CeB6 (1500h+)			FEG (10,000h+)
Common	Friendly User Interface, Fast Sample Loading			







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Phenom Software Application

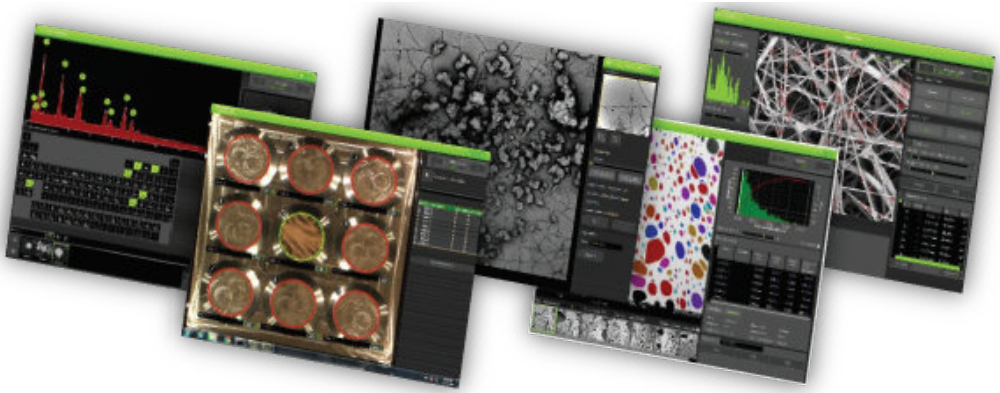
Phenom users able to extract maximum information from images made with the Phenom SEM. It extends the capabilities of the Phenom, a high-resolution imaging tool, to satisfy specific application needs.

FibreMetric

- Export all collected data
- Automated measurements
- Fast collection of all statistical data
- View and measure micro and nanofibers

ParticleMetric

- Creating image datasets
- Correlating features of particle
- Can be online or offline analysis



PoroMetric

- Correlate features of pore
- Fast and convenient operation
- Statistical data with high-quality images

AsbestoMetric

- Automated image acquisition and fiber detection
- Higher accuracy and repeatability
- Increased throughput
- Fast and easy to use

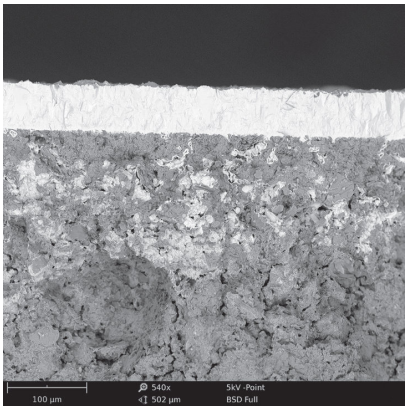
Element Identification (EID)

- Fast and reliable information of elements
- Easily exported and reported results

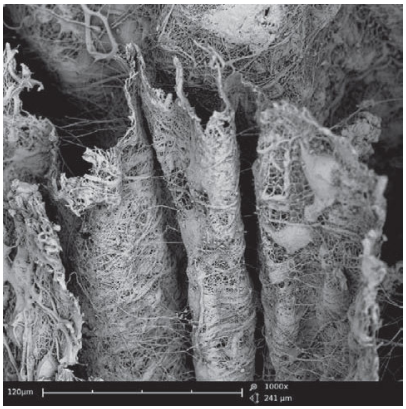
3D Roughness Reconstruction

- Intuitive fully automated & user interface
- No stage tilt required
- Fast reconstruction

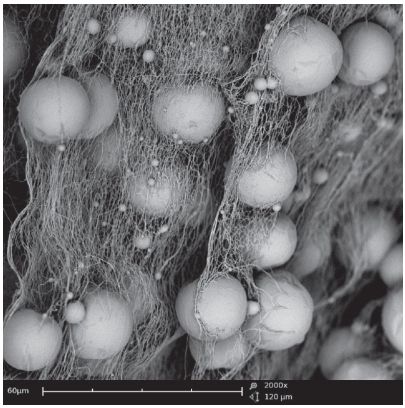
SEM Images



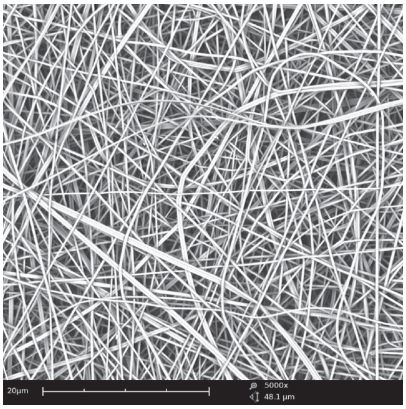
SEM image of SiC film (white layer) on graphite. Image magnification is 540x.



Cross-section of 3D nanofiber layer

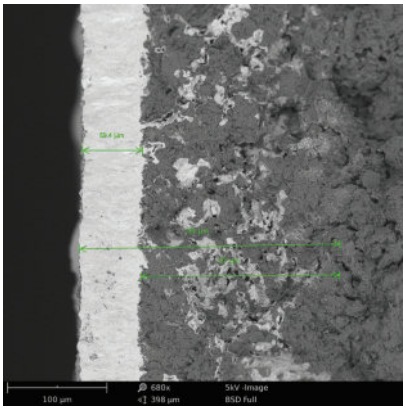


Poly(lactic-co-glycolic acid) nanofibers with beeds



Polyvinyl alcohol nanofiber layer

Biofilm cells of P. fluorescens.



Phenom SEM image of SiC film on graphite.

Advancing Materials Development with a Phenom SEM

Advantages of Using a Phenom SEM

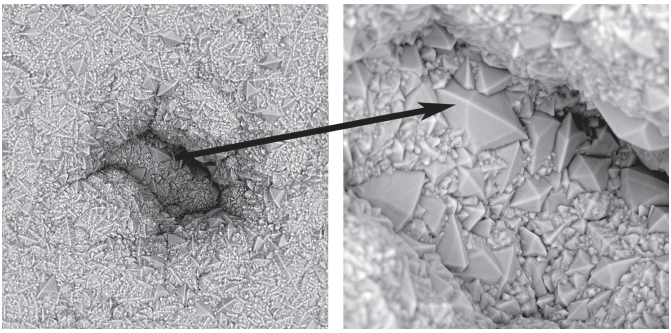
Having a Phenom SEM on site has been a huge time saver. The SEM is used to measure film thicknesses and surface morphology as a function of processing parameters. The Phenom data immediately provides critical feedback of SiC diffusion into the graphite and the crystal structure of the surfaces.

The correlative microscopy ability using the integrated camera is another benefit of the Phenom SEM for GMSI. The optical navigation is synchronized with the electron microscope image to show where defects are located, allowing quick investigation of specific areas of interest.

Trading Up to Speed Up R&D

GMSI traded in the G1 for a Phenom ProX with EDS. The higher magnification provides a full picture of every step of the process. The elemental analysis from EDS shows the elemental composition of the films, allowing GMSI to set the deposition parameters to achieve the optimum stoichiometry.

GMSI's most recent product release came to market 8x faster than before, thanks to the real time data acquisition and elemental analysis of the Phenom ProX with EDS. Peter explained: "Without the Phenom ProX SEM, we could not have developed our newest improved process".

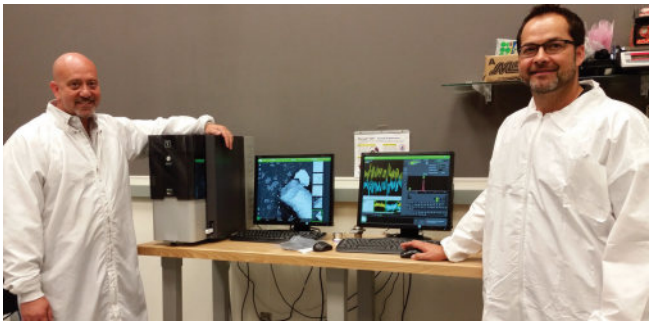


Crystal morphology is quickly observed with the Phenom SEM, showing film coverage even within defect sites. SEM image magnifications are 1000x and 3900x, left and right, respectively.

GMSI
Graphite Machining Services & Innovations, LLC

Peter Guercio

"No other tool can do what the Phenom SEM does!"



P. Guercio and P. Westphal review elemental analysis data using their Phenom ProX SEM at GMSI in Tempe, AZ

Material research at DSM

The challenge

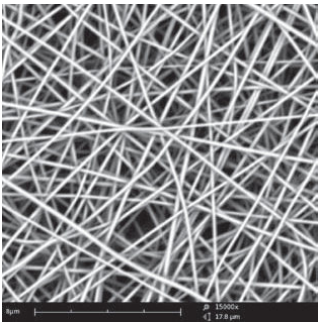
One of DSM Ahead's research topics is nonwovens for filtration. Electrospinning is used to create specific polymer fibers down to below 100 nm in diameter. Fiber size and distribution are key factors for filtration performance, and are best measured using scanning electron microscopy (SEM). DSM has a central microscopy lab where people can bring their samples for high-end imaging and analysis. The decision was made to purchase a desktop SEM to increase the number of samples screened and allow "in line" characterization during processing runs. This speeds up the project work and increases the availability of the high-end SEM at the analytical center for more detailed investigations requiring higher resolution and more advanced sample preparation.

The solution

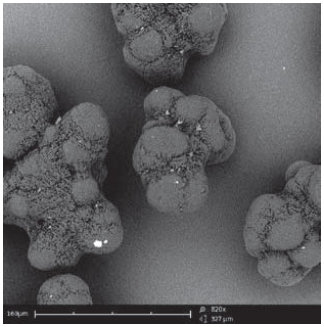
With the growing number of users, the different applications for which the Phenom is used are also growing. Some examples besides nano-fibers are:

> Imaging of drug delivery systems after in vivo studies
> Reactor powder morphology
> Abrasion and scratch tests – including level of debris – on coatings, resin and glass
> Process and application impacts on the morphology of Dyneema yarns and tapes
> Filler distribution in composite materials
> Post-mortem fracture analysis (to understand the mechanisms involved)

Every month DSM organizes a lunchtime meeting where Phenom users can share their experience and discuss issues and results with microscopy experts from the analytical department. Topics discussed include how to handle specific samples or how to gather the best information. In this way participants improve and raise their skills to a higher level.



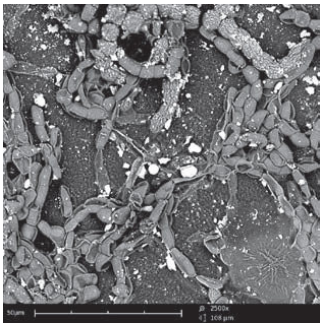
Polyamide nano-fiber-based nonwoven material prepared by electrospinning.



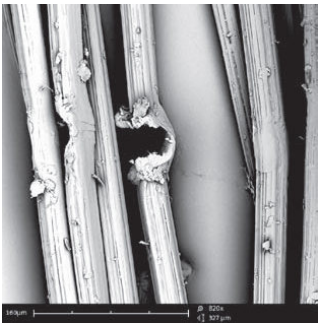
UHMWPE powder particles.

DSM
BRIGHT SCIENCE. BRIGHTER LIVING.

Dr. Arnaud Chiche
Scientist at DSM Ahead



Biodegradable particles used for sustainable drug delivery.



Damaged UHMWPE fibers.

Aiming at phenomenal cleanliness

VDL ETG is exploring the boundaries on cleanliness

In the high-tech systems industry, the trend is for components, such as vacuum systems, to be cleaner and cleaner. Customers no longer tolerate even the smallest dust particles. However, in order to get rid of them, producers must first be able to see them. With the latest Phenom tabletop model electron microscope, particles down to one ten thousandth of a millimetre can be detected. VDL ETG purchased one in the context of research on the cleaning of wafers. In regular production it's also proved its usefulness.

Methods for cleanliness investigation

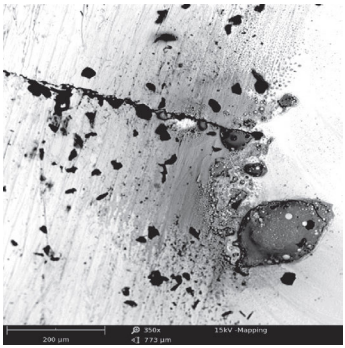
'If our clients are going in the direction of increasingly cleaner, then we have to know what we're talking about with them. And knowledge is power', says Geert Jakobs, Managing Director VDL ETG Technology & Development. His company, together with TNO and ASM Europe, is participating in a European research project to develop a new process for cleaning wafers. 'We need to gain more understanding of clean manufacturing and for that purpose, this project a nice carrier. It is about removing small dust particles, from 100 nanometres (one nanometre is one millionth of a millimetre, ed.), from the surfaces of components.

Our objective in this project is to investigate the production methods we have to use for this. These particles are so small that you can no longer see them with traditional techniques (such as visual inspection using blacklight, ed.). So we searched for a method to detect these particles and to determine where they come from'.

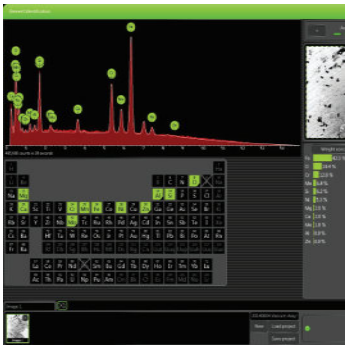
Competence build-up

Phenom-World is also entering a new area of competence with the ProX model, Ruud Bernsen says in conclusion. 'The specimen at VDL ETG is the first to be used in the Netherlands for monitoring cleanliness in a clean room. We are now looking at applications in other environments that also need to be extremely clean. This way we're able to compete with companies supplying equipment for monitoring clean rooms.'

VDL ETG
VDL Enabling Technologies Group



Sample imaged at 350x magnifcation



Chemical analysis on the same sample to investigate the elemental composition

Monitoring pharmaceutical products with tabletop SEM

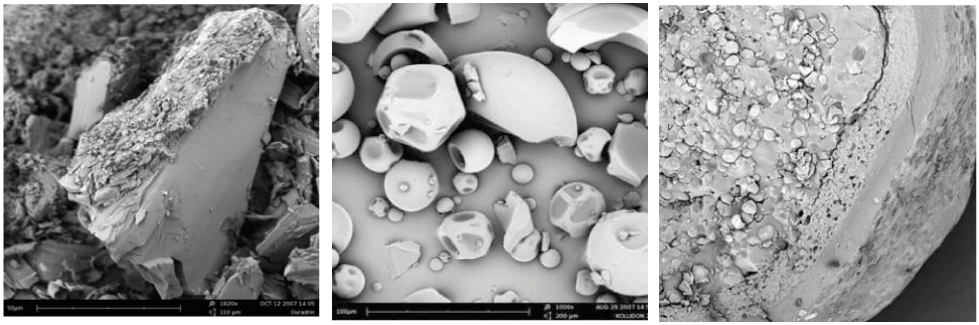
Behide pharmaceutical industry

In the pharmaceutical industry, pharmaceutical dosage forms are getting increasingly important as a basis for making more effective drugs. In the successful development of a new dosage form, formulation development typically plays a crucial role in the introduction and application of stateof-the-art pharmaceutical technology. The manufacturability and/or bioavailability of many of these dosage forms regularly depend on the characteristics of the individual ingredients. It is for this reason, that it is extremely important that the bulk characteristics of so-called particulate systems such as powders and suspensions can be accurately monitored.

Particle characterisation

On a regular basis these bulk characteristics are largely determined by the characteristics of the individual particles (e.g., morphology, surface texture, brittleness, etc.). It is safe to argue, that amongst the various particle characteristics their physical appearance is often most critical. Unfortunately, the latter is difficult to describe in absolute terms. This is even more true, since two particles are not likely to be exactly the same. For this reason, due to the complexity in the description of their physical appearance, the characteristics of a collection of particles are usually described on the basis of simplified descriptors which refer in some way to their size and the shape. Thereby, it gets easier to monitor the distribution in size and shape, and various analytical technologies have been made commercially available for that purpose.

Arjen P. Tinke
Ph.D. – Principal Scientist Particle Characterization
Johnson & Johnson
Pharmaceutical Research and Development



Some typical application images of pharmaceutical samples acquired with the Phenom

First thing that really shows off seeing the instrument is it's wonderful design. But once one is working with it, the instrument is very robust, and extremely easy to use as well. With this piece of technology one is not dependent anymore of a skilled operator, neither does one need to invest in an expensive high end SEM apparatus. I can really say, that we not often had such a fast return of investment by implementing the Phenom in our particle characterization lab.

Polymeric Nanofibers, Nanofibrous Layers, Nanofiber Yarns and Nanoparticles

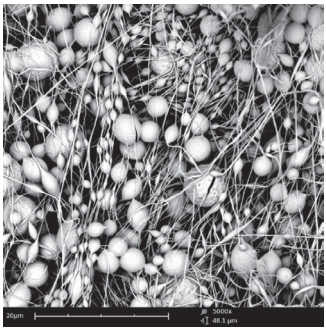
The Department of Nonwovens

The Department of Nonwovens runs courses in production technology, evaluation and innovative methods in nonwoven textile production and technical textiles. Research activities involve the testing and analysis of nonwoven textile structures including electrospinning products consisting of nanofibres. Nanofibers are defined as fibers having diameters of the order of 100 nanometers. They can be produced for instance by interfacial polymerization and electrospinning.

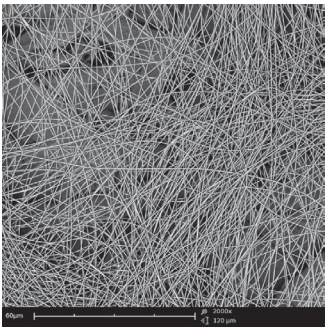
The main research and scientific activities of the department are focused on:

> Development of electrospinning technology, application of electrospun materials and complex theoretical research in this area
> Interactions between fiber assemblies and liquid phases (filtration, sorption), including computer modeling
> Physiological and thermal properties of textiles
> Compressional properties of textiles
> Technology and devices for highloft perpendicular-laid nonwovens (Struto)
> Melt-blown technology, fabric modifications and electrospinning – the production of nanofibers

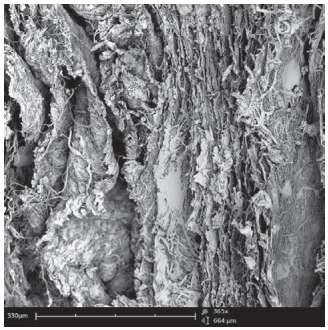
Jitka Färberová
"Working with the Phenom FiberMetric software application gives us very fast, accurate and well-presented results."



Polycaprolactone nanofibers with beeds



Polyvinyl alcohol nanofiber layer



Cross-section of 3D nanofiber layer

Used in conjunction with the FiberMetric software application, the Phenom enables fast measurement of nanofiber and pore diameters. Measurement of these parameters is automatic, so it speeds up our work and saves time. Measured values are as accurate as those obtained from manual measurements using special image analysis software. We enjoyed a great advantage having the Phenom and the FiberMetric software application together in one place and allows us to obtain complete sample information in the same session. Next advantage is that the FiberMetric software application generates statistical data and frequency diagrams of the measured diameters.

ThermoFisher
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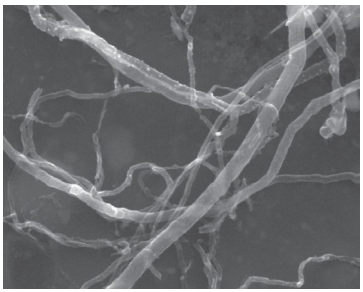
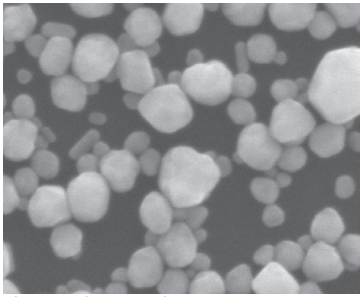
Phenom Pharos Desktop SEM

Feature:

- Small footprint
- Integrated low vacuum mode
- <2.5mm high-resolution imaging
- The faster, higher-resolution desktop SEM
- Field Emission Gun (FEG) source desktop SEM
- Variable acceleration voltage based on application
- Switch to SEM imaging mode in less than 30 seconds



Phenom Pharos Desktop SEM.
Multiwall carbon nanotubes
10 kV SE image @ 100,000x



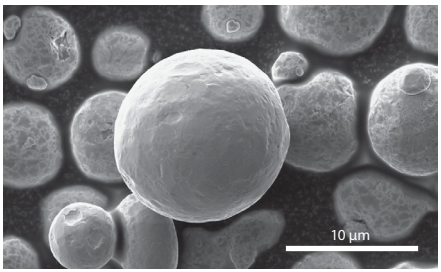
Phenom Pharos Desktop SEM.
Ag nanoparticles
15 kV SE image @ 200,000x

ThermoFisher
SCIENTIFIC

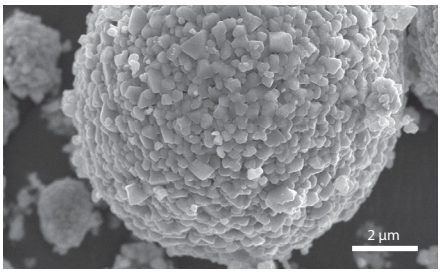
Phenom XL G2 Desktop SEM

Feature:

- Small footprint
- Automated report template
- Large sample stage (up to 32 sample)
- Long lifetime thermionic source (CeB6)
- High resolution color navigation camera
- Computer-controlled motorized X and Y
- Four-segment backscattered electron detector (BSD)



Mixed back scattered electron and secondary electron image from metal particles.



SEM image of battery cathode particles.

ThermoFisher
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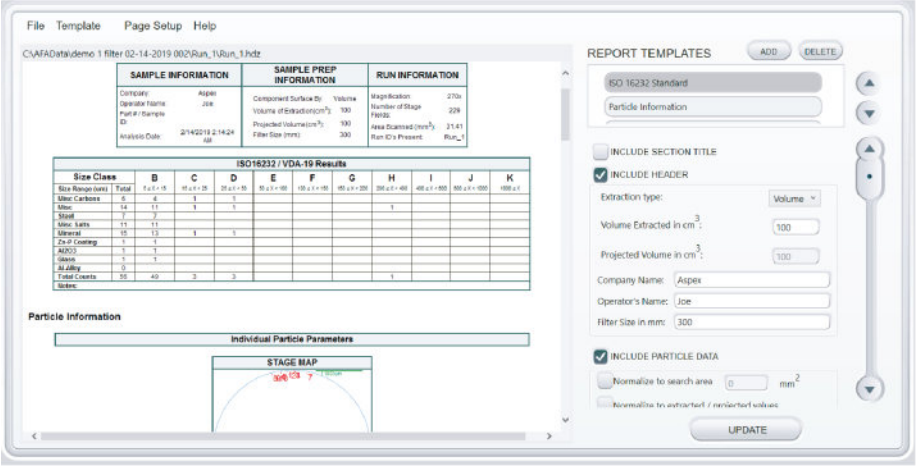
Phenom ParticleX TC Desktop SEM

The Thermo Scientific Phenom ParticleX TC Desktop SEM is a multi-purpose desktop SEM enabling technical cleanliness at the microscale. Which support in standard reports compliant with VDA 19 / ISO 16232



Technical cleanliness

With the growing demand for analysis of smaller particles beyond the scope of light microscopy within (automotive) industries, the Phenom ParticleX TC (Technical Cleanliness) Desktop SEM enables automated scanning electron microscopy with energy-dispersive X-ray spectroscopy (EDS). This is a major advantage over light microscopy as it enables chemical classification of the particles, providing great insights in your production processes and/or environments.

ThermoFisher
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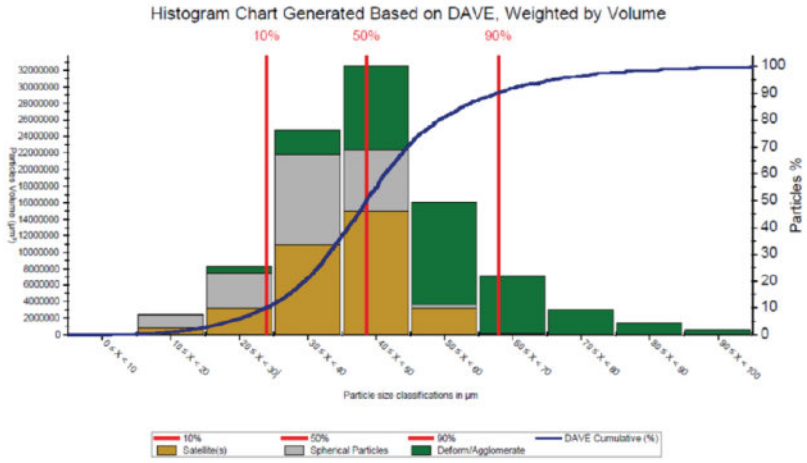
Phenom ParticleX AM Desktop SEM

The Thermo Scientific Phenom ParticleX TC Desktop SEM is a multi-purpose desktop SEM designed for additive manufacturing, delivering purity at the microscale.



Additive manufacturing

The Phenom ParticleX AM Desktop SEM measures various size and shape parameters, such as minimum and maximum diameter, perimeter, aspect ratio, roughness, and feret diameter. Identify particle size distributions, individual particle morphology, and foreign particles. All of these can be displayed with 10%, 50%, 90% values (e.g. d10, d50, d90)

ThermoFisher
SCIENTIFIC

Phenom Perception GSR Desktop SEM

The Thermo Scientific Phenom Perception GSR Desktop SEM is the only dedicated SEM specifically designed for gunshot residue analysis. Because the system is automated, it enables you to speed up the analysis process.

Feature:

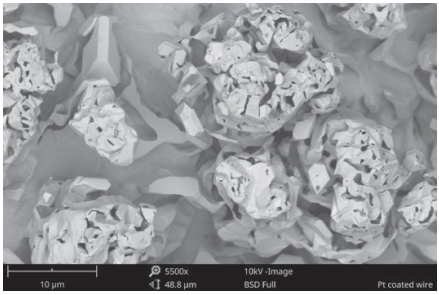
- Intuitive User Interface
- Compliant with ASTM E1588-17
- Up to 30 pin-stub on sample stage
- Compliant with ENFSI Best Practice Guidelines 2006
- Supports manual revisiting and validation of particles
- Typically ≤ 98% hit rate on plano artificial GSR sample
- Extensive reporting capabilities with flexible customizable templates

ThermoFisher
SCIENTIFIC

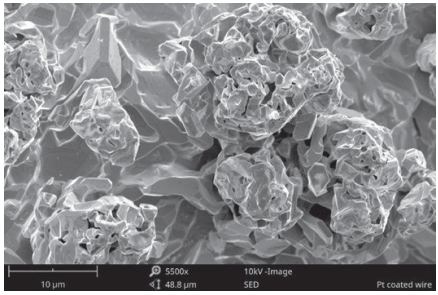
Phenom ProX Desktop SEM

Feature:

- Small footprint
- High acceleration voltage
- <6 mm high-resolution imaging
- Wide range of elements detection
- Thermoelectrically cooled detector
- Elemental Mapping and Line Scan feature
- Switch to SEM imaging mode in less than 30 seconds



Platinum coated metal grid (BSD)



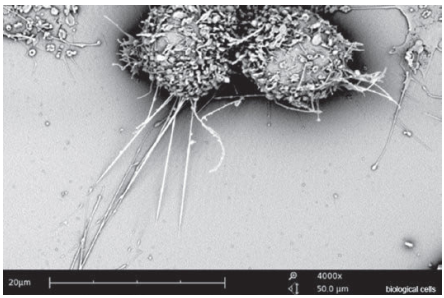
Platinum coated metal grid (SED)

ThermoFisher
SCIENTIFIC

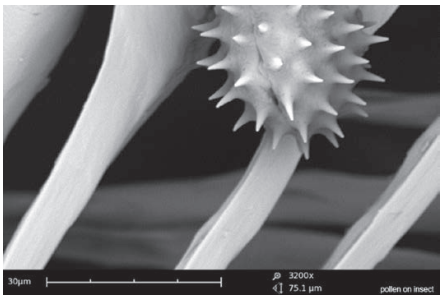
Phenom Pure Desktop SEM

Feature:

- Small footprint
- Remote assistance
- Large depth of focus
- A large variety of sample holders available
- Patented sample vacuum loading technology
- Autofocus and automated source alignments
- More than 30x magnification of a conventional light microscope



Biological cells



Pollen on insect

ThermoFisher
SCIENTIFIC

Nebula Powder Disperser

Feature:

- Guarantees an even distribution of particles for good detection
- A representative set of particles is therefore present on a stub
- Best results in combination with ParticleMetric Software.

Adjustment of the vacuum level

Deposit a small amount of powder at the top of the cylinder

TED PELLA, INC.
Microscopy Products for Science and Industry

SEM Accessories in TedPella

- Silver Paint
- SEM Starter Kit
- In Lens Mounts
- Specimen Mounts
- Slotted Vise Pin Mount
- Carbon Conductive Taps
- SEM Specimen Substrates
- Pin Stub SEM Mount Grippers
- SEM Specimen Mount Adapters
- Modular SEM Specimen Holders
- Electron Microscope Filaments for AEI / CamScan / FEI / JOEL / Leica / Hitachi / Tescan / Zeiss...

- Increased Chamber Diameter
Chamber size has been increased to permit coating of larger samples. Standard chamber 150mm diameter x 165mm.

- Target Shutter
Target shutter has been added to condition special targets prior to coating.

- Variable Chamber Geometry
Adjustable chamber height is used to improve coating uniformity and vary the deposition rate from 0.0001 to 1.0nm/sec.

- Sample Stage Movements
Separate rotary, planetary and tilting sample movements to optimize coating distribution and coverage.

xoptron

SEM Accessories in Xoptron

XCUT - Precious Cutter

XCUT provides precision sectioning using diamond cutter to achieve minimally altered surface. It provides both manual or/and auto feeding mechanism in a compact body. The long sectioning distance offers great advantage for large samples.

X-MOUNT CD50 - Cold Mounting

Automatic vacuum and pressure capable cold mount CD50 machine greatly facilitate the laborious cold mounting work.

XPOL-ATA - Grinder / Polisher

It is designed for speed and reliability for automatic grinding and polishing in the lab. Optional touchscreen allows intuitive control on overall operation. Both piston and center force system are available for flexibility and rigid applications.

X-MOUNT HT - Hot Mounting

XMOUNT-HT delivers precise and rigid mounting for smooth grinding and polishing in the later stage. The quick processing time with automation offers great advantage for mass production facilities.

NEUROPOWER™

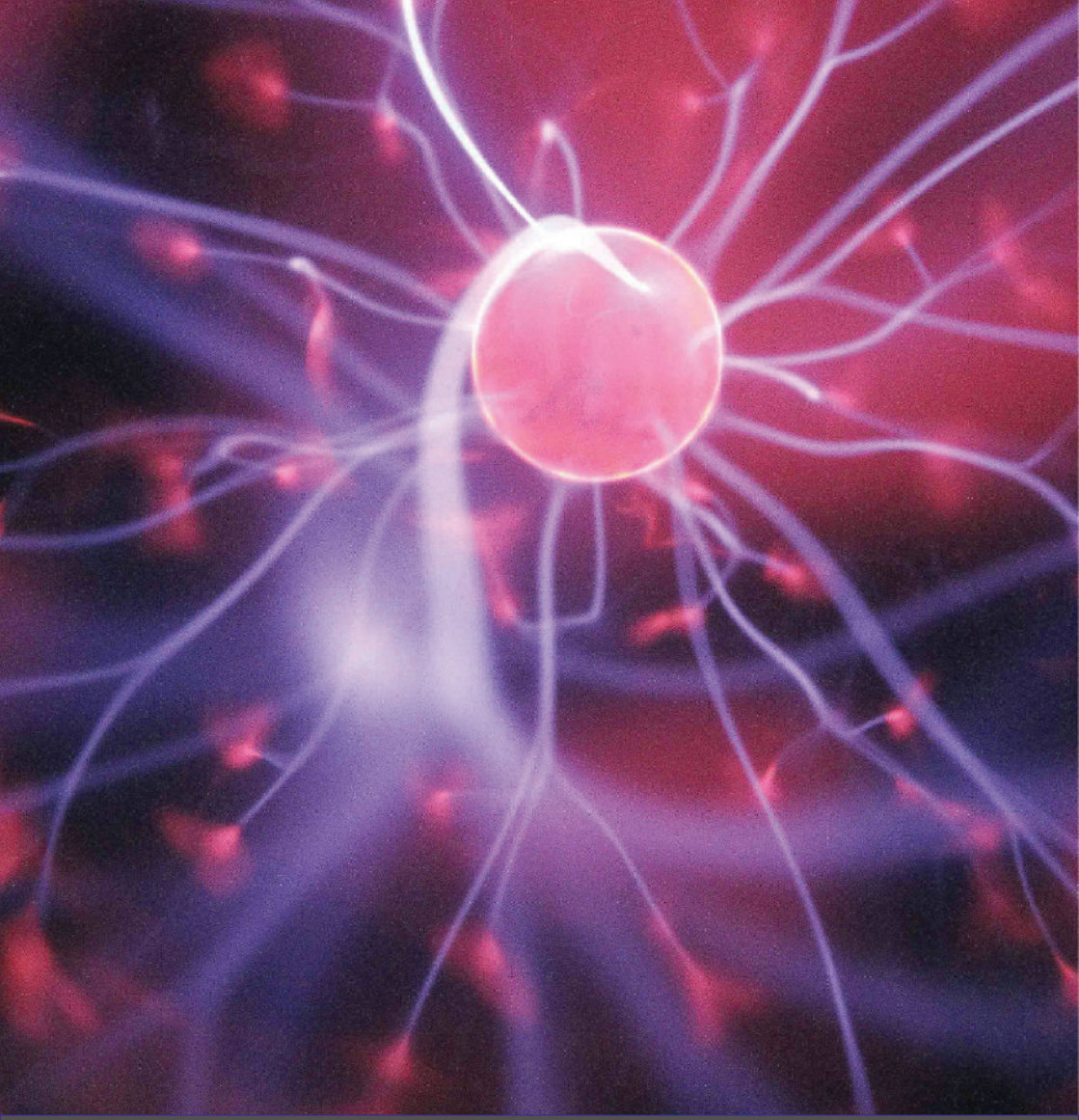
SEM Accessories in Neuropower

Technical Specification

MODEL		Cronus Pro IK/IKS	Cronus Pro 2K/2KS	Cronus Pro 3K/3KS	Cronus Pro 6K/6KS	Cronus Pro IOK/IOKS
Phase		Single Phase with Ground				
Output Power Factor		1000VA/900W	2000VA/1800W	3000VA/2700W	6000VA/5400W	10KVA/9KW
INPUT						
Voltage Range		80VAC - 300VAC ±3%@50% load 160-300VAC for 1K & 2K@100% load, 190-300VAC for 3KVA & Above			80VAC - 300VAC ±3%@40% load 176 -300VAC@100% load	
Frequency Range		40Hz ~ 70Hz			45-55Hz or 54-66Hz	
Phase		Single phase with ground				
Power Factor		≥ 0.99				
OUTPUT						
AC Voltage & Regulation		208/220/230/240 VAC+/- 1%				
Frequency Range (Batt. Mode)		50Hz ±0.5%				
Current Crest Ratio		3:1				
Harmonic Distortion		≤ 2% THO (linear load), ≤5% THO (non-linear load)				
Overload Protection	Line Mode	105%-110% Warning without shutdown TransferBypassfor 111%-120% @60s, >120% Immediately			Transfer Bypass for 105%-125%@ 1 min, 126%-135%@30s, 136%-150%@10s, >150% Immediately	
	Battery Mode	105%-110% Warning without shutdown Shutdownfor 111%-120%@10s, >120% Immediately			Shutdownfor 105%-125%@60s 126%-135%@30s, >135% Immediately	
	Bypass Mode	110%-130% Warning without shutdown Shutdownfor >130% Immediately			Cut-off for 125%-150% & Warning for 60s Cut-off for 150%-170% & Warning for 10s Cut-off for >170% & Warning for 1s	
Waveform (Batt. Mode)		Pure Sinewave				
Output Type		2 x British	2 x British	3 x British + Terminal	Terminal	Terminal
EFFICIENCY						
AC Mode		88%	90%	91%	92%	
Battery Mode		85%	87%	88%	90%	
ECO Mode		96%	96%	96%	96%	
BATTERY						
Standard K Model	Battery Type (Qty)	12V/9AH (2pcs)	12V/9AH (4pcs)	12V/9AH (6pcs)	12V/7AH (16pcs)	12V/9AH(16pcs)
	Typical Recharge Time to 90%	4 Hours	4 Hours	4 Hours	5 Hours	6 Hours
	Charging Current (CC)	1.5A	1.5A	1.5A	1.0A	
	Charging Voltage (FV)	27.4VDC ±1%	54.7VDC ±1%	82.2VDC ±1%	218.4VDC ±1%	
Extended KS Model	Battery Type (Qty)	2pcs & depending on Battery AH	4pcs & depending on Battery AH	6pcs & depending on Battery AH	16pcs & depending on Battery AH	
	Typical Recharge Time to 90%					
	Charging Current (CC)	4A/8A	4A/8A	4A/8A	4A	
	Charging Voltage (FV)	27.4VDC ±1%	54.7VDC ±1%	82.2VDC ±1%	218.4VDC ±1%	
INDICATORS						
Status		LCD display for load level, battery level, AC mode, battery mode, bypass mode and fault indicator				
ALARM						
Battery Mode		Beeping every 10 seconds				
Low Battery		Beeping every 2 seconds				
Overload		Beeping twice every second				
Fault		Continuously beeping				
PHYSICAL						
Standard K Model	Dimension, D xW xH (mm)	327 x 140 x 191	390 x 151 x 225	416 x 196 x 342	412 x 196 x 702	412 x 196 x 702
	Net Weight (kgs)	14.5	17.14	21.3	63	68
Extended KS Model	Dimension, D xW xH (mm)	327 x 140 x 191	390 x 151 x 225	390 x 151 x 225	412 x 196 x 342	412 x 196 x 342
	Net Weight (kgs)	4.0	6.9	7.5	12.6	13
ENVIRONMENT						
Humidity and Operating temperature		20-90% RH@0-40°C (non-condensing)				
Noise Level@l meter		<45dB			<55dB	
MANAGEMENT						
Smart RS-232		CLOUD Ready PowerMaster Management Software Supports Windows				
HID Compliant USB						
Smart Slot		For Mini-Wifi CMCARD-W, Mini-Eth CMCARD-E, Mini SNMP PMCARD and Mini DCT400 Dry Contact Card				

• In the interests of continuous product improvement, all specifications are subject to change without notice.

Cronus Pro 6K/10KS



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