

금속 다공체 개발 및 응용사례

2018년 2월

박 만 호

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III. 나가며

ASFLOW 소개

Tube & Pipe



Valve & Regulator



Fittings



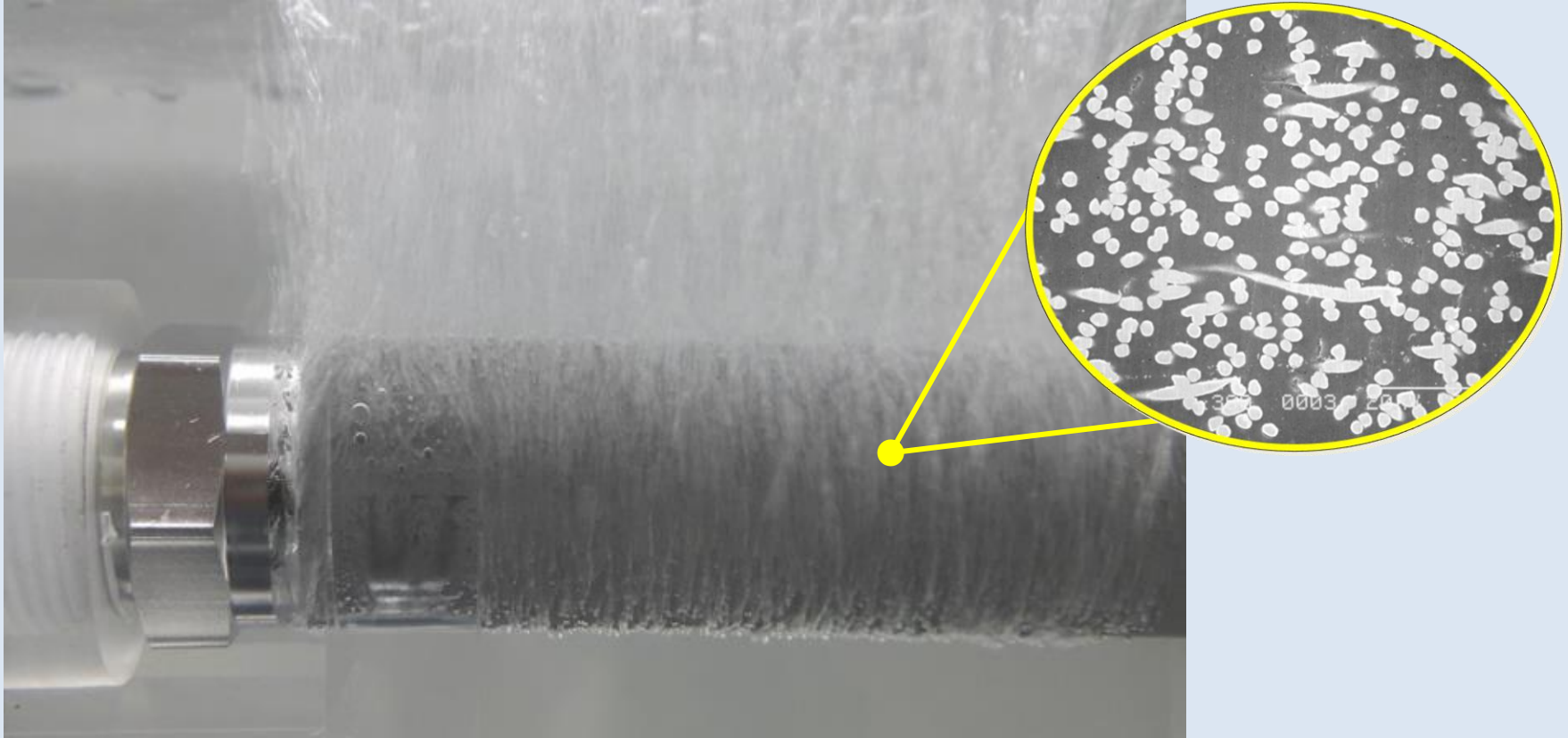
Metal Powder Filter



ASFLOW

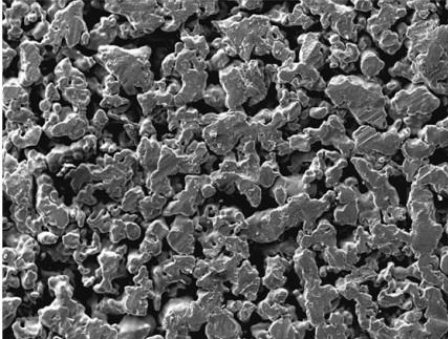
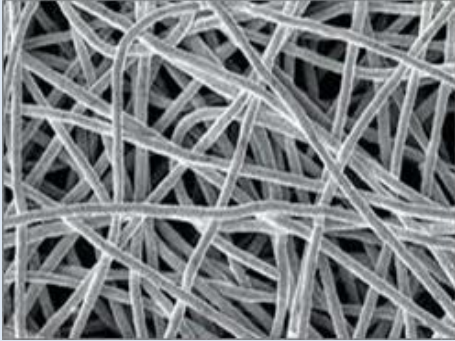
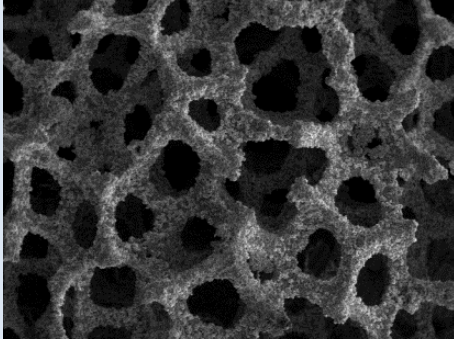
- 반도체 및 디스플레이 생산 공정의 튜브 및 밸브, 레귤레이터, 디퓨저, 필터 등을 공급 중

금속다공체란?

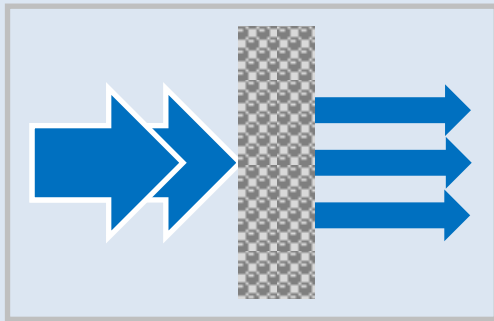


- 소재 내부에 기공이 30% 이상인 소재
- 대표적으로 금속분말 소결체, 금속섬유 소결체, 금속 폼 등이 있음

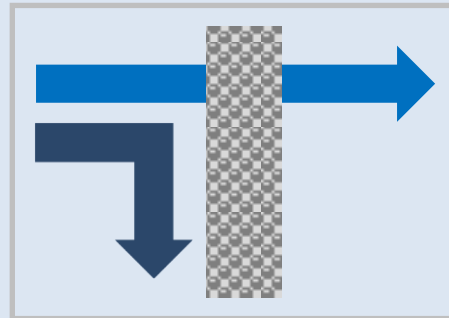
금속다공체의 종류

	Metal powder	Metal fiber	Metal foam
<ul style="list-style-type: none"> 다공체의 형상 			
<ul style="list-style-type: none"> 기공크기 (μm) 	> 10	> 150	> 100
<ul style="list-style-type: none"> 기공율 (%) 	< 60	60-80	> 80
<ul style="list-style-type: none"> 유체흐름 	X	X	O
<ul style="list-style-type: none"> 고온내구성 	높음	낮음	높음
<ul style="list-style-type: none"> 주요기업 	ASFLOW, Porvair, Mott	Bekaert, FiberTech	Sumitomo, Alantum

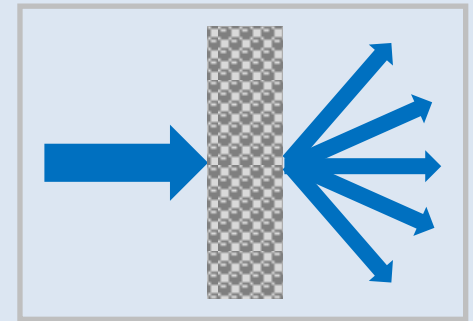
금속다공체의 주요기능



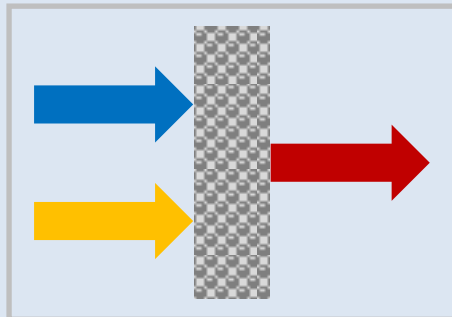
Throttling & Damping



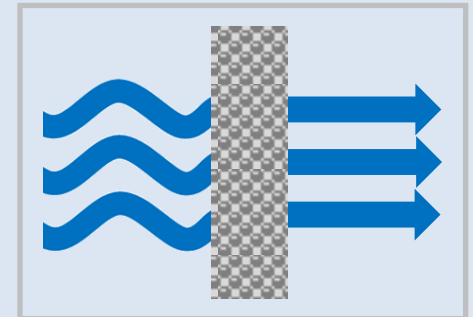
Filtration & Separation



Dispersion




Mixing




Straightening

금속다공체의 응용사례

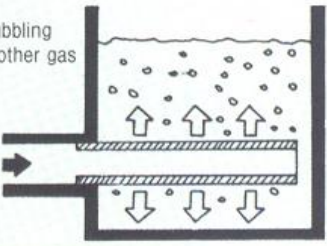
• Classifying & Power Transportation
Reaction, fermentation, transfer, classifying separating etc. by supplying the gas or air to the open site.



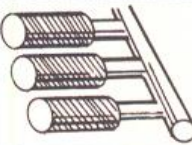
• Air flow hopper
• Bridge prevention of fine powder
• Air slider
• Air conveyor




• Air diffusion
Fine foaming / bubbling of air, oxygen or other gas in a liquid.




• Air diffuser pipe
• Air blower
• Promotion of fermentation



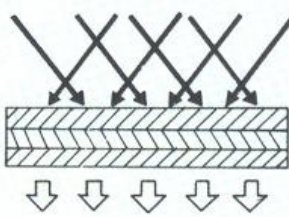
• Cleaning
Protection for instrument, protection of equipment in critical pressurization protection against the inflow of solid material to the leak valve etc.



• Protection against the inflow of solid material to instruments such as a pressure gauge
• Pneumatic equipment
• Draining

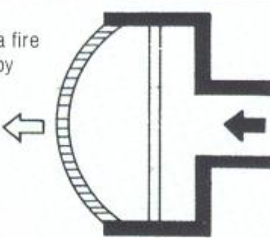


• Kneading & Mixing
To moderate an abrupt pressure rise or sucking action




• Buffer filter
• Kneading of screw mixer
• Line mixer
• Emulsification mixing
• Mixing blade/plate

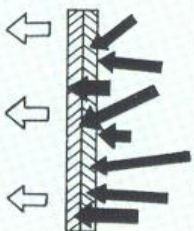
• Flame Arrestment
To arrest the spread of a fire to such as gas and fuel by shutting off the frame.




• Burner/combustion apparatus
oxygen cylinder
• Gas/smoke sampling port
• Flame arrester
• Cooling of combustion chamber



• Sound Attenuation
Sound attenuation by absorbing the shock wave of the gas.



• Muffler
• Exhaust silencer
• Acoustic apparatus



금속분말 다공체 응용사례



Inline Filter



IGS Filter



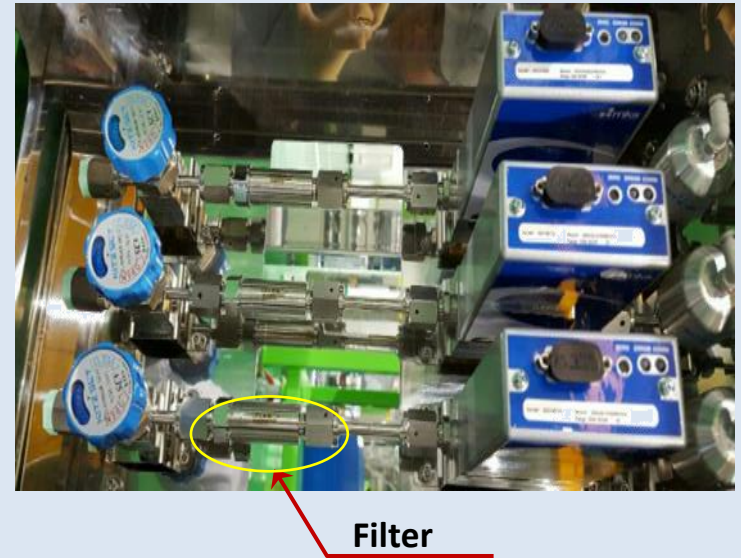
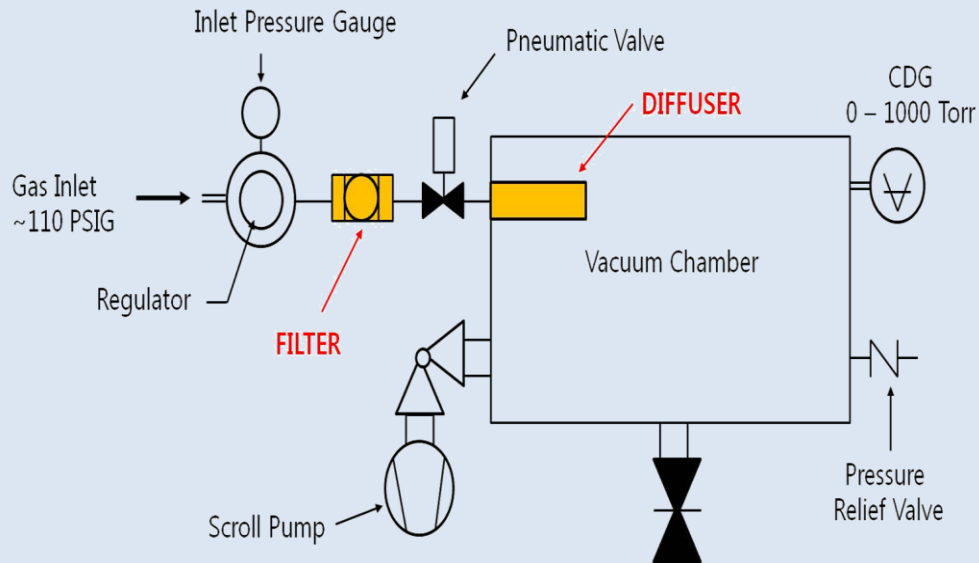
Gasket Filter



Bulk Filter

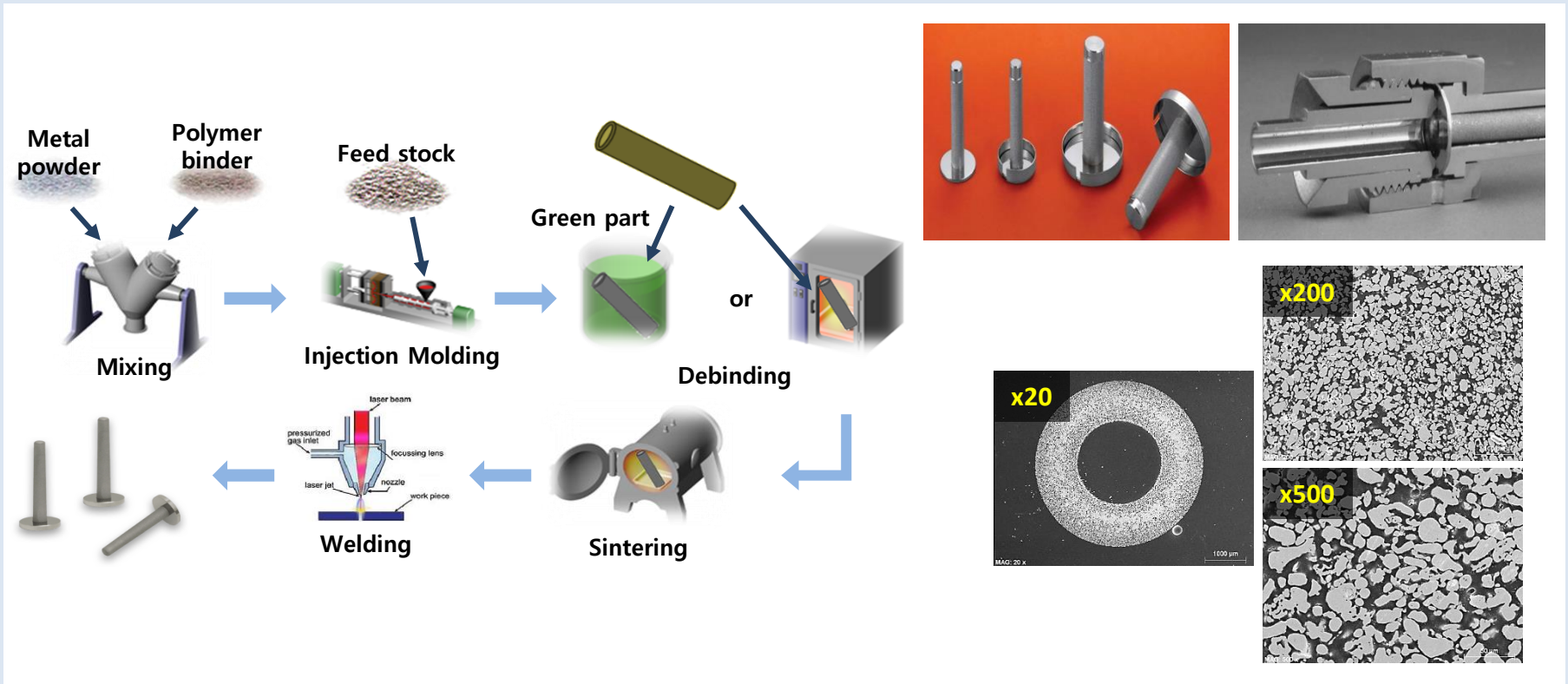
- 수nm 크기의 분진 여과 및 가스 확산 기능의 Stainless Steel 316L / Hastelloy 금속분말 소결품 공급 중

ASFLOW Diffuser / Filter Applications



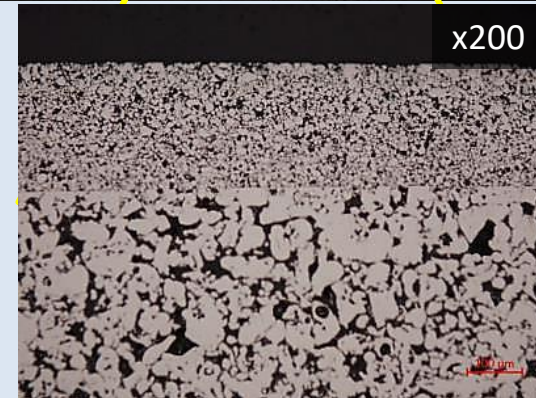
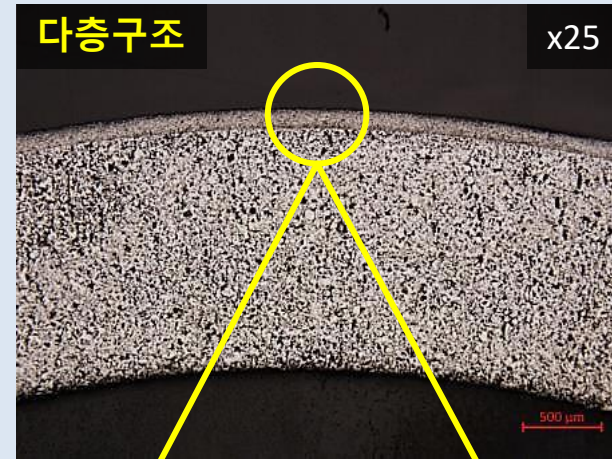
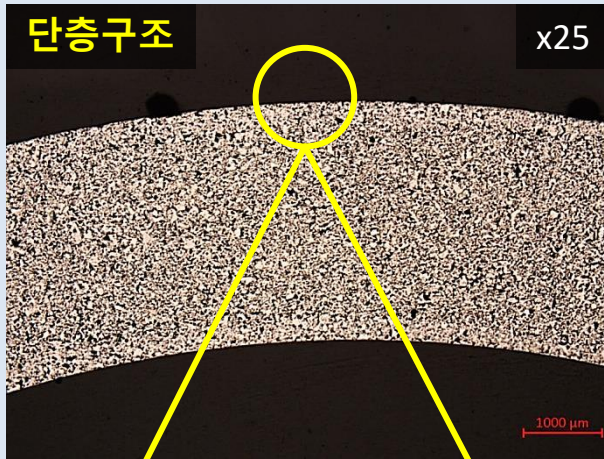
- 반도체 및 디스플레이 생산 장비의 진공 챔버 내외에 설치해서 사용
- 가스 중 이물질을 제거하고, 가스를 균일하게 확산시켜 코팅이 균일해지도록 하는 역할

반도체 공정가스 여과용 필터



- IGS용 가스켓 필터 개발 (Dimension : Φ 4 – 25L)
- ΔP : 30kPa 이하 (@20LPM)
- 0.3 μ m 입자 제거율 99.9% 이상

반도체 공정가스 여과용 필터

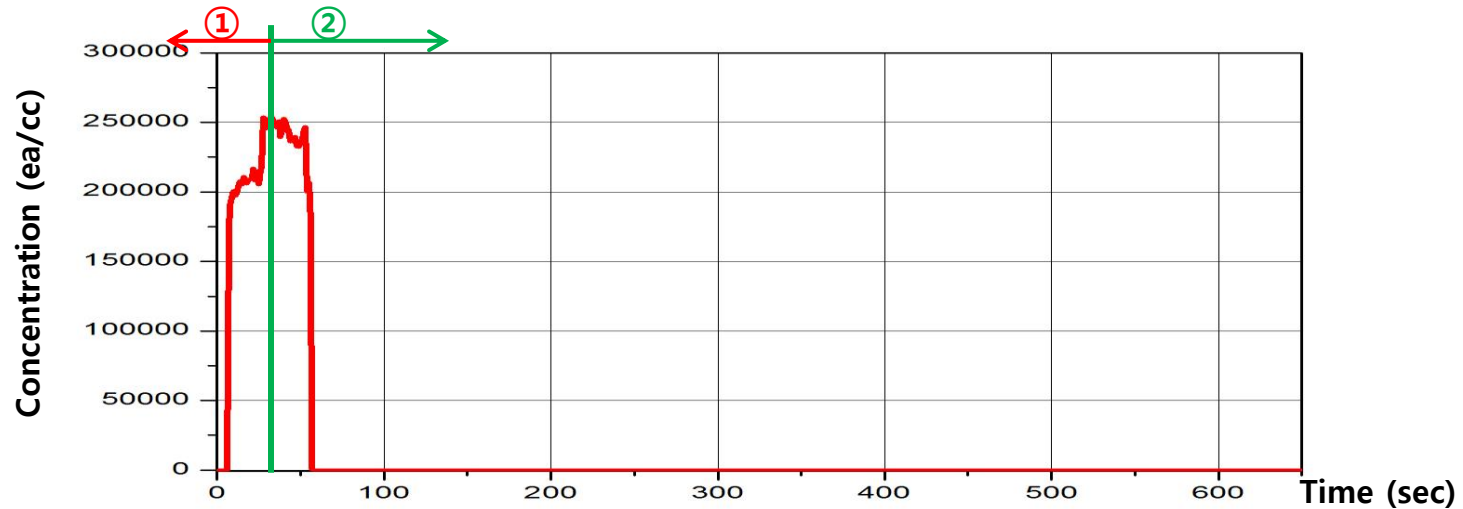
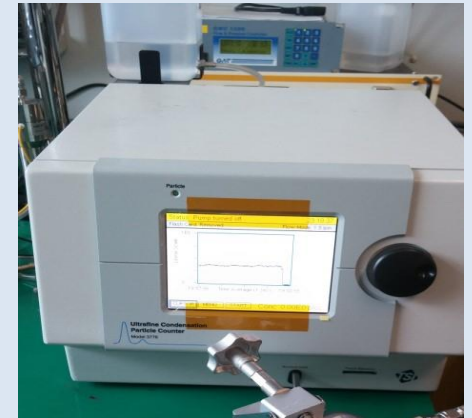
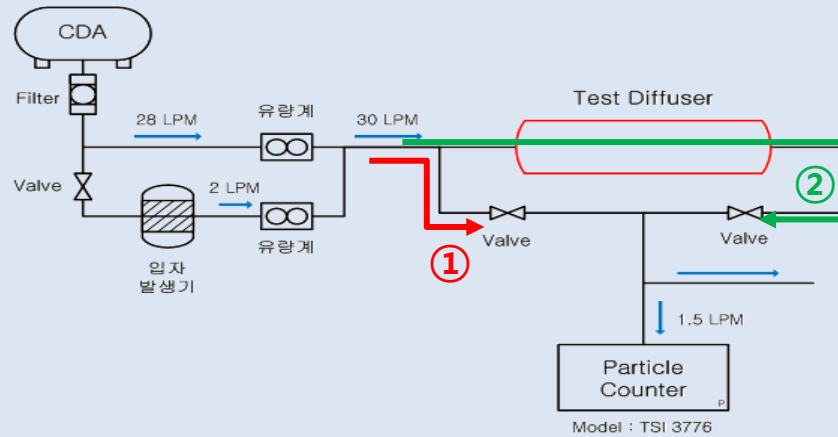


- 미세여과층을 포함하는 다층 구조의 대유량 필터 개발

금속분말 다공체 기공율 제어기술

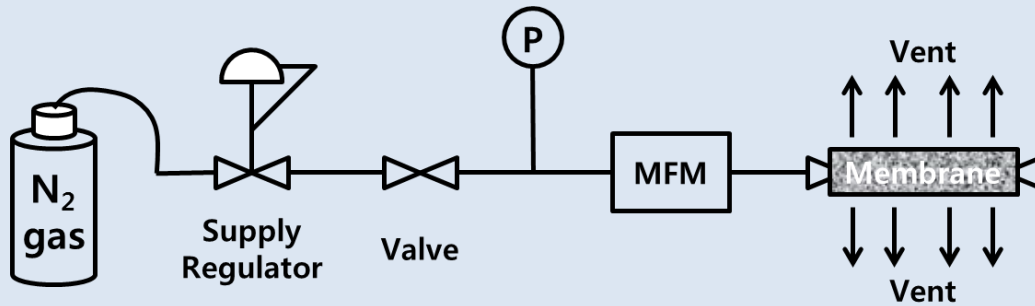
Particle retention

분석장비	TSI 3776
분석범위	0.0025 ~ 3 μm
검출유량	1.5 LPM
사용물질	Ag (Silver)
입자크기	0.007 μm
입자농도	200,000 ea/cc
측정시간	600 sec
사용유량	30 LPM

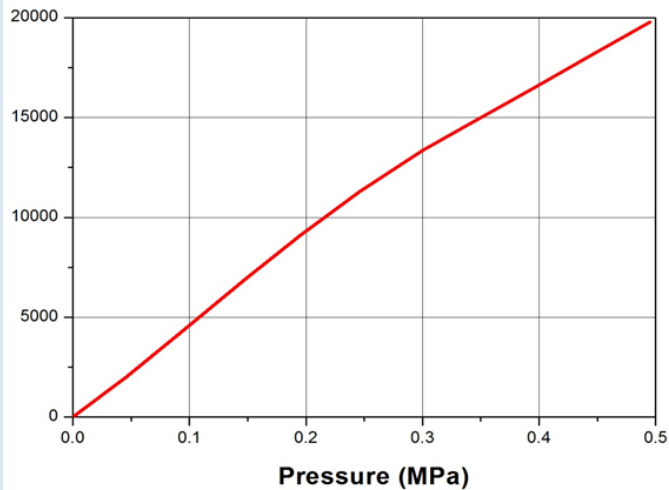


금속분말 다공체 기공율 제어기술

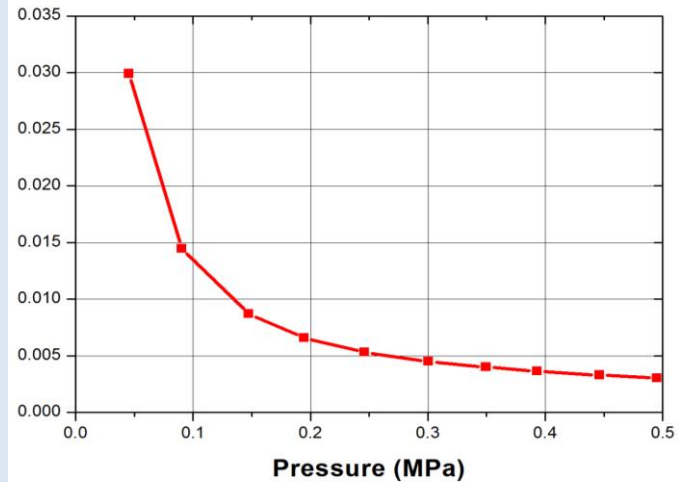
Flow rate



Flow (LPM)



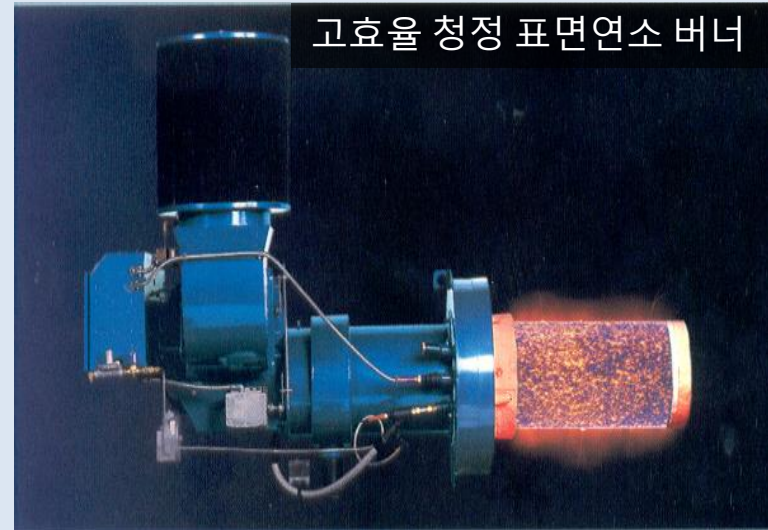
Vent Time (sec/L)



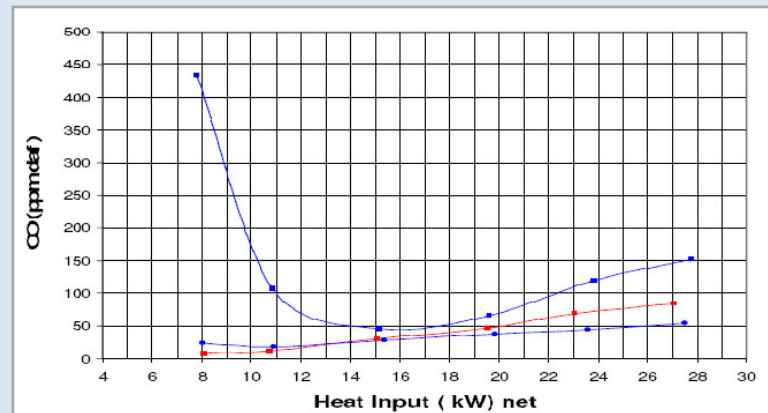
기타 : 금속섬유 제조기술

기 계 가 공 법	공 법	금속섬유형상	파 괴 이 기 판	공 법	금속섬유형상		
	다발인발 법 (Bundle Drawing)	<p>A-B 단면 B-B 단면 스테인레스강 외피재 인발 후 단면 인발 후 단면</p>			CME 공법 (Crucible Melt Extraction)		
	절삭법 (Shaving)	<p>코일 가이드롤 금속섬유 권취기 온수</p>			PDME (Pendant Drop Melt Extraction)	<p>Round Bar Fiber Disc</p>	
분말압출법 (Powder Extrusion)	<p>Metal powder Salt Extrusion</p>		In-Rotating- Water-Spinning	<p>① 드럼, ② 병과수, ③ 노즐, ④ 유압실린더, ⑤ 가열로림</p>	<p>100µm</p>		

기타 : 금속섬유 다공체 응용사례



면속도 (cm/s)	집진효율 (%)	선경	압력손실 (Pa)
3.5	99.996 (0.3 μm)	1 μm	261.55
3.5	99.99 (0.3 μm)	2 μm	800
1.25	99.983 (0.3 μm)	5 μm Fiber	9
1.25	99.05 (0.3 μm)	5 μm Powder	74
1.7	98.5 (0.5 μm)	5~10 μm	-
8.3	97.7 (0.5 μm)	5~10 μm	-



나가며

진공 장비용 금속필터 / 디퓨저 기술
아스플로가 선도하겠습니다.

“감사합니다!”



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