RESiFA™ SUNSPERA

AGC

Catalyst Supports for Polyolefin Manufacturing

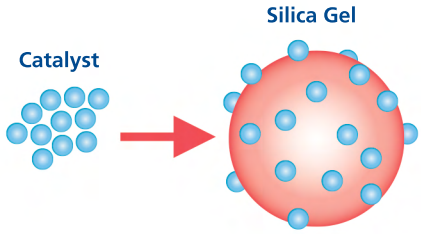
Catalysts are materials that initiate, control, or increase chemical reactions without being consumed in the process. Catalysts are very important in the chemical process as they optimize throughput and regulate the byproducts of chemical reactions.

Catalyst Supports play an equally important role in the catalyst process. Catalyst supports are solid materials typically having high surface areas, porosity and are chemically inert. The catalyst supports have two main functions:

- carry/support the catalyst material
- properly distribute the catalyst for optimum chemical reactivity.

Selecting the right catalyst support is important in optimizing the manufacturing process. Several factors need to be considered:

- **Thermal Stability** affects the reaction rate between the catalyst and reacting material
- **Shape and Packing Density** can affect fluid flow rates and processes
- **Particle Strength** of the catalyst carrier needs to withstand catalyst preparation/loading and be able to collapse during polymerization
- **Surface Area and Porosity** directly relate to the reactivity levels of the chemical process and also the properties of the finished product. The higher the surface area, the higher the number of sites for a catalyst to attach, which leads to higher reactivity levels.



Catalyst Support

SUNSPERA™ silica gels are excellent catalyst supports in the manufacture of polyethylene and polypropylene because they are chemically inert, have high surface areas and a range of porosity levels.

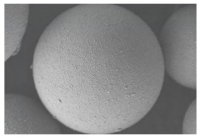
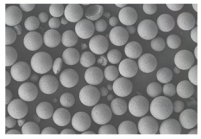
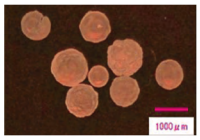
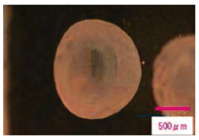
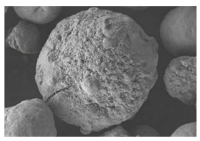
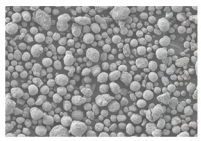
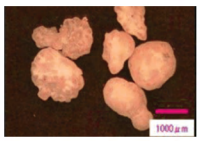
The properties of the SUNSPERA™ silica gel have a significant effect on the polymerization process and properties of the finished polymer.

Key Attributes

- Spherical shape
- Wide combination of particle size and porosity
  - Particle size range: 3µm - 70µm
  - Pore volume range: 0.7 - 2.3 ml/g
  - High and wide surface area range: 40 - 800 m^2/g
- Uniform porosity throughout particle
- Narrow particle size and pore size distribution

Benefits

- Morphology helps control polymerization reaction
- High loading of catalyst leads to high catalyst activity
- Produces high specific gravity and high bulk density of the polymer
- Improved morphology of finished polymer
- Optimizes production
- Prevents reactor fouling

	Bare Silica		After Polymerization	
SUNSPERA				
Competitor				

The pore structure, spherical shape and particle distribution of SUNSPERA™ are precisely defined. Using these silicas improves the finished polymer morphology (Shown above, After Polymerization) and increases bulk density.

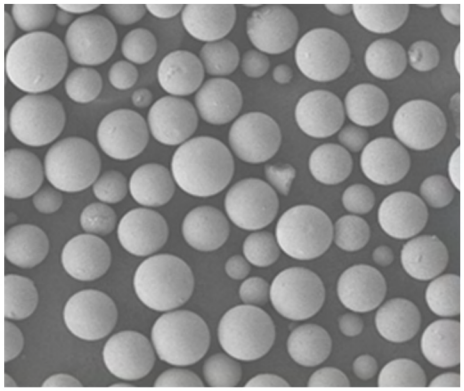
SUNSPERA Product Selection Guide

For Slurry/Cascade Polyolefin Polymerization Processes

Grade	HH Series High Surface Area, Hard Particles				HB Series High Surface Area, Breakable Particles					LB Series Low Surface Area, Breakable Particles	
	H-31	H-51	H-121	H-201	H-32	H-52	H-122	H-33	H-53	L-52	L-123
Suitable for	Polyolefins not requiring transparency				Polyolefins requiring transparency such as HDPE and MDPE					Polyolefins requiring transparency such as LLDPE Metallocene	
Mean particle size (μm)	3	5	12	20	3	5	12	3	5	5	12
Specific surface area (m^2/g)	800	800	800	800	700	700	700	700	700	300	300
Pore volume (ml/g)	0.9	0.9	0.9	0.9	1.6	1.6	1.8	1.8	1.8	1.6	2.0
Pore diameter (nm)	4.5	4.5	4.5	4.5	-	-	-	-	-	12	50
Oil absoption capacity (ml/100g)	150	150	150	150	300	300	300	400	400	300	400
	• Small pore size allows for polymerization to occur on surface • Original shape is maintained throughout polymerization • High Surface Area leads to high catalyst activity				• Larger pore size allows for polymerization to occur on surface and at the core • Particle fragmentation during polymerization • High Surface Area leads to high catalyst activity					• Wide pore size allows for ethylene gas to impregnate inside the particle • High catalyst activity due to easy fragmentation of silica particles	

For Gas Phase Polyolefin Polymerization Processes

Grade	DM Series		
	DM L-303	DM L-403(NS)	D-70-120A(LV)
Average particle size (μm)	35	40	65
Specific surface area (m^2/g)	300	380	450
Pore volume (ml/g)	2.1	2.2	1.7
Pore diameter (nm)	60	20	15
Span value (-)	0.5	N/A	0.95
Mechanical strength (MPa)	2.9	N/A	6.3
	• Narrow Particle Size distribution • Resulting polyolefin morphology is excellent and has higher bulk density • The 300 and 400 series are recommended for Metallocene catalyst support • D-70 series are very suitable for Ziegler-Natta or Phillips catalysts		



DM-L-303

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