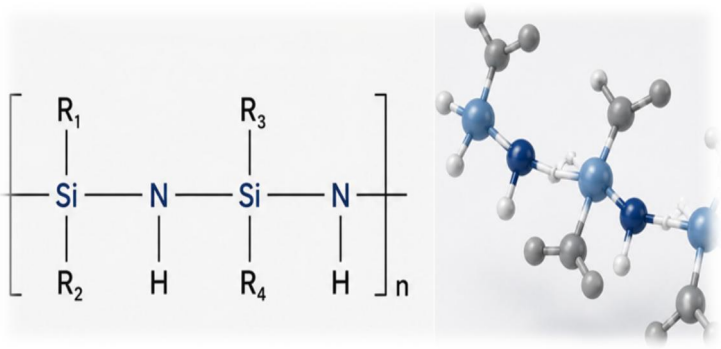
Guangzhou SIO New Material

Polysilazane Resin

Organopolysilazane (OPSZ) & Perhydropolysilazane (PHPS)



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About US

SIO New Material (SIOResin®) is a leading manufacturer specializing in advanced polymer materials and innovative waterborne solutions. We provide comprehensive R&D, production, sales, and technical services for industries including coatings, cosmetics, textiles, machinery, construction, and other high-tech fields.

Driven by innovation and market demands, we are committed to delivering high-performance, reliable, and competitive materials to support our customers worldwide.

Core Product Range:

Silicone Resins

Featuring excellent high-temperature resistance, corrosion resistance, weather durability, and chemical stability, silicone resins are widely used in protective coatings for cookware, automotive components, industrial equipment, and outdoor applications.

Waterborne Polymer Resins

Including waterborne polyurethane dispersions (PUDs) and waterborne acrylic resins, our products offer excellent adhesion, flexibility, abrasion resistance, water resistance, and environmental performance. They are widely applied in industrial coatings, leather, textiles, adhesives, automotive coatings, wood coatings, and architectural coatings.

Polysilazane Resins

Advanced ceramic precursor materials with excellent heat resistance, oxidation resistance, chemical stability, and barrier properties. Polysilazane resins are widely used in high-performance protective coatings, aerospace materials, semiconductor applications, and advanced ceramic manufacturing.

Additives

Including crosslinker, leveling agents, defoamers, wetting agents, thickeners, and sensory modifiers, our additives improve coating performance, formulation stability, surface appearance, and application properties.

We value Quality, Innovation, and Service

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SIO-9233 Room Temperature Curing Polysilazane Resin

Product Description

SIO-9233 is a low-viscosity liquid polysilazane resin with a silicon-nitrogen backbone, designed for both ambient and thermal curing coating systems. It contains Si-N-Si linkages, which allow it to self-cure at room temperature through hydrolysis and oxidation. It forms a three-dimensional crosslinked network upon curing, delivering outstanding mechanical performance.

SIO-9233 exhibits low viscosity and strong adhesion and can be applied to a wide range of substrates including metals, alloys, glass, coated surfaces, and plastics (e.g., PP, PC, PVC, PMMA) via wiping, dipping, spraying, or brushing.

Key Features

- Low viscosity, high hardness
- Excellent hydrophobicity
- High heat resistance, Non-flammable after curing
- Anti-oxidation and corrosion resistance
- Anti-graffiti surface
- Strong adhesion to metal and ceramic substrates
- Multiple curing methods

Properties

Property	Value
Appearance	Colorless to light yellow transparent liquid
Solid Content	≥98%
Viscosity (mPa·s)	10–20
Density (g/cm³)	1.01
Flash Point (℃)	>110
Refractive Index	1.4670 ± 0.0010
Molecular Weight / PDI	1500 / 1.07
Pencil Hardness	5H (12h); 7H (24h)
Adhesion	Grade 0 (crosshatch test)
Water Contact Angle	110°
Instant Heat Resistance	800°C
Long-Term Heat Resistance (Clear Coat)	400°C

Applications

Can be used as a clear coat or combined with various pigments and fillers such as:

- Organic & inorganic pigments

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- Metallic powders (Zn, Al, stainless steel)
- Ceramic powders (Si_3N_4, B_4C, Al_2O_3, BN)
- Compatible with other film-forming resins and additives.

Processing Parameters

Item	Value	Item	Value
Resin content in coating	2–90%	Volatility	Low
Theoretical coverage (m^2/kg)	12–28	Solid film thickness (μm)	0.3–40
Curing temperature (°C)	20–100	Curing time (h)	0.5–24
Pot life (h)	24	Instant max temperature (°C)	800
Recommended diluents	Hydrocarbons, esters, ethers	Recommended use temp (°C)	-30 to 400
Storage temperature (°C)	0–30		

Note: This is a single-component thermosetting product. Once opened, use within 24 hours. Clean tools promptly to prevent solidification. For best performance, apply in one coat with a dry film thickness ≤30 μm.

Standard Application Process

Surface Cleaning → Drying → Spraying → Curing

Instructions for Use

1. When spraying, use argon or high-purity nitrogen instead of air to prevent premature curing and haze formation.
2. Compatible with non-protonic organic solvents (alkanes, aromatics, ethers, ketones, esters).
3. Contains physically and chemically bound amines—handle with proper protection.
4. Reacts violently with water, alcohols, acids, and bases.
5. Clean tools immediately with acetone or turpentine; cured materials cannot be removed with solvent—use 10% NaOH for soaking if needed.

Safety Precautions

- Always follow the product's Material Safety Data Sheet (MSDS).
- Wear solvent-resistant gloves (e.g., butyl rubber), safety goggles, and appropriate A2 B2 E2 K2 Hg/P3 respirators.
- Keep out of reach of children. Store in a cool, dry, ventilated area below 30°C.
- Do not mix waste with protonic substances (e.g., water, alcohols). Dispose of waste at authorized facilities.

Packaging & Storage

- Available in: 1kg, 2kg, 3kg sealed containers. Shelf life: 12 months (unopened)
- Store in a dry, cool, well-ventilated area (0–20°C), away from heat and ignition sources.

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SIO-9219 Room Temperature Curing Polysilazane Resin

Product Description

SIO-9219 is a solvent-free, room-temperature self-curing polysilazane product. During curing, the main reactions involve the hydrolysis and oxidation of Si-NH-Si bonds. Meanwhile, Si-NH-Si groups can react with hydroxyl groups (-OH) on the substrate surface, providing excellent adhesion between the coating and the substrate.

With the addition of appropriate catalysts, the reactions between Si-H and Si-NH-Si groups can be promoted, forming a three-dimensional crosslinked structure after curing. This structure provides the coating with excellent mechanical properties.

The cured coating exhibits pencil hardness above 4H, excellent non-yellowing properties, and strong chemical bonding with substrates. It is suitable for applications including electrical insulation coatings, wear-resistant and fire-resistant coatings, outdoor hydrophobic self-cleaning and anti-aging coatings, and skin-friendly antibacterial topcoats. Through covalent bonding with the substrate, the coating achieves significantly enhanced mechanical strength and durability.

Applicable Substrates

Suitable for:

- Carbon steel;
- Stainless steel;
- Cast iron;
- Aluminum alloys;
- Titanium alloys;
- High-temperature alloy steels;
- Microcrystalline glass panels;
- Ceramics;
- Cement and other inorganic substrates.

Operating Temperature Range

Suitable for:

- Outdoor applications with continuous service temperatures below 400°C;
- Short-term exposure applications up to 600°C.

The actual temperature resistance of the coating may vary depending on the thermal resistance of different substrates.

The coating also demonstrates excellent thermal shock resistance and resistance to rapid heating and cooling cycles.

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Coating Performance

Test Item	Performance Specification	Test Method
Color and Appearance	Light yellow to colorless transparent liquid	GB/T 1721-79
Solid Content ((120±2)℃)	>90%	GB/T 1725-2007
Density (g/mL)	0.88±0.1	GB/T 6750-2007
Pencil Hardness	≥4H	GB/T 6739-2006
Adhesion	Grade 0	GB/T 9286-1998
Neutral Salt Spray Resistance	>500 h	GB/T 10125-2021
Water Contact Angle	>100°	GB/T 26490-2011
Artificial Weathering Resistance	30 days: No rust, chalking, cracking, or discoloration	GB/T 1865-2009
Dielectric Strength (V/mm)	$\geq 10^5$	ASTM D149
Electrical Resistivity (Ω·m)	$\geq 10^{12}$	GB/T 35856-2018

Basic Application Parameters

Item	Specification
Coating Solid Content	>90%
Volatility	Solvent evaporates easily
Theoretical Coverage	6–8 m²/kg
Curing Temperature	Room temperature
Dry Film Thickness	20–50 μm
Curing Time	>24 h
Pot Life / Working Time	4 h
Maximum Short-Term Temperature Resistance	600°C
Recommended Thinner	Aromatic hydrocarbons, esters, ethers, etc.
Recommended Operating Temperature	-30°C to 400°C
Flash Point	<22°C (solvent flash point)
Storage Temperature	0–30°C

Special Notes

- This product is a single-component self-curing coating.
- Once opened, the coating should be used within 4 hours.
- For longer intervals between coating operations, application tools must be cleaned promptly to prevent cured coating buildup.
- One-pass spraying is recommended.
- The dry film thickness should not exceed 50 μm; excessive thickness may negatively affect coating performance.

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Standard Application Process

Surface Cleaning → Surface Roughening → Cleaning and Air Blowing → Spraying → Curing

Application Procedure

1. Surface Roughening Treatment

Before coating, the substrate surface should be mechanically ground or sandblasted to remove rust, dust, dirt, and other contaminants.

Surface roughening has a significant influence on coating performance:

- Recommended surface preparation: Sa 2.5;
- Minimum requirement: St3 level without oxide scale;

According to GB/T 30790.4-2014.

Proper surface preparation is essential for achieving optimal coating performance.

2. Cleaning

Use a suitable cleaning agent or degreaser to remove residual oil, dust, and contaminants after surface roughening.

3. Substrate Drying

Before coating application, ensure that the substrate surface is completely dry and clean.

4. Coating Preparation

- This is a single-component product.
- Take the required amount of coating and filter through a 120-mesh filter before use.

5. Coating Application

- Laboratory spraying recommendation:
    - Spray gun nozzle size: 1.0 mm;
- The cured coating has certain hydrophobic and oleophobic properties; therefore, repeated recoating is not recommended.

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6. Curing

After spraying:

- Surface dry: approximately 2 hours;
- Touch dry: more than 3 hours;
- Fully cured: more than 24 hours.

Storage and Shelf Life

1. Store according to national regulations. The storage area should be dry, cool, well ventilated, and away from heat sources and open flames. Keep containers tightly sealed and handle carefully.
2. Storage temperature should be maintained between 5°C and 30°C. Shelf life is 6 months.
3. Any unused coating after opening must be resealed tightly and stored properly.
4. Mixed or prepared coating leftovers cannot be returned to the original container and should be disposed of according to local regulations.
5. Products beyond the shelf life may only be used after passing quality verification tests.

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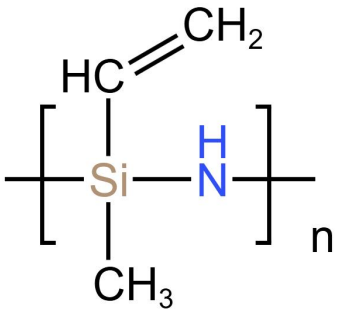
SIO-9312 Methyl Vinyl Polysilazane

Product Overview

SIO-9312 is a methyl vinyl polysilazane polymer with a Si–N bonded backbone. The molecular structure contains reactive carbon-carbon double bonds (Si–C=CH_2), offering unsaturated reactive sites. This polymer exhibits unique reactivity: the Si–N bonds readily react with hydroxyl-containing substances, enabling its use as an amine-type curing agent. Meanwhile, the unsaturated double bonds allow for addition reactions, facilitating molecular weight regulation or functional group introduction.

SIO-9312 combines the processability of organosilicon materials with the high-temperature resistance of inorganic compounds, offering thermal stability up to 600–800°C. It can also be pyrolyzed into ceramic materials.



Technical Specifications

Test Item	Value
Appearance & Color	Pale yellow to colorless transparent liquid
Viscosity (DIN-4 Cup)	11 seconds
Active Content	≥95%
Solid Content (120±2°C)	>96%
Density (g/mL)	1.02 ± 0.01
Molecular Weight Range	255–591
Hardness (Pencil Test)	≥4H
Adhesion	Grade 0 (Excellent)
Salt Spray Resistance	>800 hours

Applications

1. **Resin Modification**
   Through addition reactions between its vinyl groups and unsaturated resins (e.g., polybutadiene, unsaturated polyester), SIO-9312 significantly enhances the crosslinking density and thermal resistance. For hydroxyl-containing resins (such as epoxy or phenolic), the Si–N bonds participate in the curing reaction,

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increasing the glass transition temperature (Tg) by 20–30%, and improving weatherability and UV resistance.

2. **Rubber Industry**
   As a processing aid for silicone rubber, it optimizes the microstructure of vulcanized rubber and raises the heat resistance by over 50°C. It also improves tensile strength and abrasion resistance. Suitable for synthetic rubbers such as SBR and NBR, introducing silazane structures enhances thermal and mechanical performance.
3. **Ceramic Precursors and Functional Coatings**
   SIO-9312 serves as a precursor for fabricating SiC/Si_3N_4 composite ceramics, ideal for high-temperature components in aerospace engines. In coatings, its derivatives form dense protective layers that provide corrosion and oxidation resistance, maintaining performance under extreme conditions.

Curing Conditions

(Relative humidity: 50%, dry film thickness: 5–25 μm)

Temperature (°C)	Touch Dry (h)	Full Cure (h)
165	1.0	1.0
180	0.2	1.0
200	0.1	0.5
250	0.1	0.5

Application Instructions

Standard Procedure:

Surface treatment → Sandblasting/rust removal → Cleaning & drying → Coating → Curing

Key Notes:

- Surface Preparation: Sandblast or grind to remove oxide scale, rust, and oil. Recommended surface cleanliness: Sa2.5 (optimal), minimum St3.
- Cleaning & Drying: Use a dedicated degreaser or cleaner; ensure surface is thoroughly dry.
- Product Preparation: Single-component liquid; shake well before use and filter with 400-mesh.
- Application: Spray recommended (nozzle 0.5–1.0 mm) for best film uniformity and appearance.
- Curing:
  - For <400°C use: bake at 180°C for 30 min after 10 min air dry.
  - For >400°C use: bake at 250°C for 30 min after 10 min air dry.

Storage & Transportation Requirements

1. Store in a dry, cool, and ventilated place, away from heat and open flames. Keep sealed and avoid direct sunlight.
2. Storage temperature: 5–30°C; shelf life: 6 months.
3. Reseal any unused material immediately to prevent moisture contamination.
4. Do not reuse leftover mixed coating. Dispose of according to local regulations.
5. Expired products may be used after passing quality tests.

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SIO-9112 Epoxy-Modified Polysilazane Resin

Product Overview

SIO-9112 is a high-performance epoxy-modified polysilazane resin that uses polysilazane as the primary film-forming agent, blended with high-performance epoxy resins, and optimized with diluents, inhibitors, and leveling agents to improve processability. It cures via chemical crosslinking and forms covalent bonds with the substrate, significantly enhancing mechanical strength, heat resistance, and weatherability. It is suitable for demanding environments requiring adhesion and protection.

Key Features

- **High Strength & Hardness**: Pencil hardness of 6H+, enhanced adhesion via covalent bonding
- **Thermal & Weather Resistance**: Long-term resistance to 300°C, UV yellowing resistance, and salt spray corrosion resistance
- **Stable Protection**: Excellent boiling water resistance, acid and alkali resistance, abrasion resistance, and impact resistance
- **Insulation & Heat Resistance**: Dielectric strength >105 V/mm, ideal for high-temperature electrical components

Technical Specifications

Test Item	Performance Index	Test Method
Appearance & Color	Transparent to semi-transparent pale white liquid	GB/T 1721-79
Solid Content (120±2°C)	>65%	GB/T 1725-2007
Density (g/mL)	1.00±0.02	GB/T 6750-2007
Hardness (Pencil)	≥6H	GB/T 6739-2006
Adhesion	Grade 0	GB/T 9286-1998
Neutral Salt Spray Resistance	>500h	GB/T 1771-2007
Water Contact Angle	≥105°	GB/T 26490-2011
Artificial Aging Resistance	3 days: no rust, no chalking, no cracks, slight discoloration	GB/T 1865-2009
Dielectric Strength (V/mm)	≥105	ASTM-D149

Typical Applications

- High-Temperature Bonding: Structural bonding for aerospace and automotive engine components
- Infrastructure & Bridges: Protective coatings for concrete and steel structures
- Corrosion Resistance: Heavy-duty coatings for chemical equipment, offshore platforms, and oil pipelines
- Electronics & Electrical: High-temperature insulation, PCB protection coatings, coil impregnation
- Mechanical Protection: Wear- and corrosion-resistant coatings for precision instruments, tools, and molds

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Basic Application Parameters

Parameter	Value	Curing Conditions	Value
Theoretical Coverage	6–8 m²/kg	Room Temperature Cure	>24 h
Dry Film Thickness	20–150 µm	High Temp Cure (180°C)	<0.5 h
Pot Life	3 h	Max Instant Temp	500°C
Thinner	Aromatics, esters, ethers	Recommended Use Temp	-30 to 300°C
Flash Point	<22°C (solvent)	Storage Temp	0–30°C

Application Instructions

Once opened, the mixture should be used within 3 hours. If extended application time is required, clean application tools promptly to avoid curing on equipment. A single spray coat is recommended with dry film thickness not exceeding 150 µm.

Standard Application Procedure:

Surface cleaning → Abrasion → Cleaning & air drying → Spraying → Curing

Step Details:

1. Abrasion: Sand or blast the substrate to remove rust, dust, and contaminants. Surface preparation quality significantly affects coating performance. Optimal: Sa2.5; Minimum: St3 (per GB/T 30790.4-2014).
2. Cleaning: Use dedicated degreasers or cleaners to remove any residual grease or particles.
3. Drying: Ensure the substrate is clean and dry before application.
4. Material Preparation: Filter the product through a 120-mesh screen before use.
5. Application & Bonding: Apply the product to the bonding surface, and fix components. After surface curing, the coating develops hydrophobic and oleophobic properties.
6. Curing: Air dry for >2 hours (surface dry), full cure in >24 hours, or heat cure at 180°C for 30 minutes.

Storage Guidelines

1. Store in a dry, cool, well-ventilated environment, away from heat and open flames. Keep containers tightly sealed.
2. Storage temperature: 5°C to 30°C; Shelf life: 6 months.
3. Reseal containers tightly if not fully used.
4. Do not reuse mixed material; dispose of according to local regulations.
5. Products past the shelf life must pass quality testing before use.

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SIO-9114 Silicone-Modified Polysilazane Resin

Product Description

SIO-9114 is a two-component, silicone-modified polysilazane system. The modified polysilazane offers outstanding toughness, adhesion, and anti-yellowing properties. It maintains excellent flexibility even under 180° bending without cracking. The coating achieves 0 grade adhesion (best), and significantly enhances hydrophobicity, stain resistance, insulation, and dielectric strength.

The clearcoat without fillers can withstand temperatures above 330°C without yellowing. With functional fillers, it can resist temperatures above 600°C. This dramatically expands the performance range and application scope of polysilazane coatings.

Applications

1. Microcrystalline glass, telecommunication devices, instrumentation, medical and pharmaceutical equipment, public transportation
2. Hydrophobic surface coating for smartphone panels, mold surfaces, photovoltaic backplates, automotive wheels, public facilities
3. Small appliances and kitchenware (e.g., nonstick pans, rice cookers)
4. Insulating components, coil coatings, insulation repair and pretreatment
5. Electric heating elements, tanks, housings
6. Semiconductor industry (e.g., PCBs)

Main Properties of SIO-9114 Coating

Test Item	Performance	Test Method
Resin Form	Two-component (A & B)	—
Appearance and Color	Pale yellow to colorless transparent liquid	GB-T 1721-79
Solid Content (120±2°C)	>50%	GB/T 1725-2007
Density (g/mL)	0.86 ± 0.02	GB/T 6750-2007
Pencil Hardness	≥6H	GB/T 6739-2006
Adhesion	Grade 0 (best)	GB-T 9286-1998
Neutral Salt Spray Resistance	>500h	GB-T 10125-2021
Water Contact Angle	>115°	GB/T 26490-2011
Artificial Aging Resistance	30d: No rusting, chalking, cracking, discoloration	GB-T 1865-2009
Dielectric Strength (V/mm)	≥105	ASTM-D149
Electrical Resistivity (Ω·m)	$\geq 10^{13}$	GB/T 35856-2018

Service Temperature

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Designed for applications up to 450°C, with short-term endurance at 550°C. Actual temperature resistance may vary depending on the substrate material. The coating also resists thermal cycling and thermal shock.

Recommended Substrates

Carbon steel, stainless steel, cast iron, aluminum alloy, titanium alloy, high-temp alloys, microcrystalline glass, ceramics, cement, etc.

Basic Application Parameters

Item	Value	Item	Value
Solid Content (%)	>50	Volatility	Solvent-based, fast-evaporating
Theoretical Coverage (m^2/kg)	6–8	Curing Temperature (°C)	Room Temp / 140°C
Dry Film Thickness (μm)	8–150	Curing Time (h)	>12 / <0.5
Pot Life (h)	1–2	Peak Temp Resistance (°C)	550
Diluent Type	Aromatics, esters, ethers	Recommended Use Temp (°C)	-30 to 430
Flash Point (°C)	<22 (solvent-based)	Storage Temp (°C)	0–30

Note: This is a two-component system. Use within 12 hours after mixing. Clean tools promptly to avoid hardening. Recommended single-pass spray; dry film thickness should not exceed 100 μm.

Standard Application Procedure

Surface Cleaning → Sanding → Blowing Off → Spraying → Curing

Process Notes:

1. **Surface Preparation**: Sandblasting or mechanical abrasion to remove rust, dust, oil. Recommended Sa2.5 (optimal), minimum St3 (GB/T 30790.4-2014).
2. **Degreasing**: Use a dedicated cleaner or degreaser.
3. **Drying**: Ensure the substrate is clean and dry.
4. **Mixing**: Mix the two components and filter with 120 mesh before use.
5. **Coating**: Use 1.0 mm nozzle for best appearance and film uniformity. Due to the hydrophobic nature after curing, re-coating is not advised.
6. **Curing**: Surface dry in 1 hour at room temp, tack-free after 2h, fully cured in 24h. For faster cure: 180°C for 20 minutes.

Storage Instructions

1. Store in a dry, cool, well-ventilated place, away from heat or flames. Keep containers tightly sealed.
2. Storage temp: 5°C–30°C. Shelf life: 6 months from manufacturing date.
3. Reseal immediately after use.
4. Do not reuse leftover mixed material; dispose of in accordance with local regulations.
5. Expired material may be used after passing inspection.

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SIO-9116 Acrylic Modified Polysilazane Resin

Product Description

SIO-9116 is a **single-component acrylic modified polysilazane resin** developed through acrylic modification technology. The modified polysilazane exhibits excellent toughness, hardness, adhesion, and yellowing resistance, while providing outstanding hydrophobicity, anti-graffiti, and self-cleaning properties.

The acrylic modification significantly improves the water resistance, moisture resistance, and mildew resistance of polysilazane coatings while maintaining the inherent advantages of polysilazane materials, including high hardness, abrasion resistance, weather resistance, temperature resistance, and high optical transparency.

The cured coating can withstand **180° bending without cracking**, with excellent flexibility and adhesion performance (**cross-cut adhesion rating: 0**). It is widely applicable in automotive coatings, adhesives, electronic sealing materials, flooring coatings, and specialty textile auxiliaries.

SIO-9116 is suitable for various substrates, including: Stainless steel, Glass, Cast iron, Aluminum alloys, Titanium alloys, High-temperature alloy steels, Glass-ceramics, Ceramic materials, Photovoltaic glass panels, Various fiber-based materials.

Coating Properties

Test Item	Performance
Color and Appearance	Light yellow to colorless transparent liquid
Solid Content (120 ± 2℃)	>50%
Density (g/mL)	0.89 ± 0.02
Pencil Hardness	5H
Adhesion	Grade 0
Neutral Salt Spray Resistance	>2000 h
Water Contact Angle	105°–110°
Artificial Weathering Resistance	30 days without rusting, powdering, cracking, or discoloration
Dielectric Strength (V/mm)	≥10^5
Volume Resistivity (Ω·m)	≥10^{13}

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Basic Application Parameters

Item	Specification	Item	Specification
Coating Solid Content (%)	>50	Volatility	Solvent evaporates rapidly
Theoretical Coverage (m^2/kg)	10–15	Curing Temperature (℃)	Room temperature – 150
Dry Film Thickness (μm)	20–100	Curing Time (h)	>24 / <0.5
Pot Life (h)	3–6	Maximum Short-Term Temperature Resistance (℃)	400
Diluent	Esters, Xylene, Ethers	Recommended Service Temperature (℃)	-30 to 300
Flash Point (℃)	<22 (solvent flash point)	Storage Temperature (℃)	0–30

Special Notes : SIO-9116 is a single-component curing product. After opening, the coating material should be used within 6 hours.

For longer intervals between coating operations, application tools should be cleaned properly to prevent material curing and solidification on equipment.

It is recommended to complete coating application in a single spray pass. The dry film thickness should not exceed **100 μm**, otherwise coating performance may be affected.

Standard Application Process

Surface Cleaning → Surface Roughening → Cleaning and Drying → Transfer to Spray Equipment → Spray Application → Curing

Application Instructions

1. Surface Roughening Treatment

Before coating application, the substrate surface should be mechanically polished or sandblasted to remove rust, dust, oil contamination, and other impurities.

Surface preparation has a significant influence on coating performance. The recommended surface preparation grade is **Sa 2.5**, with the minimum requirement of **St 3 without oxide scale** according to **GB/T 30790.4-2014**.

2. Cleaning

Use an appropriate cleaning agent or degreaser to remove residual oil, dust, and contaminants remaining after surface roughening.

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3. Substrate Drying

Before coating application, ensure that the substrate surface is completely dry and clean.

4. Coating Application

For laboratory spraying, a **1.0 mm spray nozzle** is recommended to achieve better coating appearance and uniformity.

After curing, the coating exhibits certain hydrophobic and oleophobic properties; therefore, repeated coating application is not recommended.

5. Curing

After spraying:

- Surface dry time at room temperature: approximately **30 minutes**
- Touch dry time: > **2 hours**
- Fully cured time: > **24 hours**

Accelerated curing is also possible:

- **150℃ × 20 minutes**

Storage Conditions

1. Store according to applicable chemical storage regulations. The storage environment should be dry, cool, well ventilated, and away from heat sources and ignition sources. Containers must remain tightly sealed and handled carefully.
2. Recommended storage temperature: **5℃–30℃**. Shelf life: **12 months**.
3. Any remaining product after opening must be resealed tightly and stored properly.
4. Mixed or diluted unused coating material should not be returned to the original container. Dispose of waste according to local regulations.
5. Products beyond the shelf life may only be used after quality verification confirms that they meet the required specifications.

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SIO-9261 UV-curable Acrylic-Modified Polysilazane

Product Description

SIO-9261 is an acrylic-modified polysilazane resin based on a polysilazane backbone grafted with acrylate functional groups. After curing, the coating film exhibits extremely high pencil hardness, excellent yellowing resistance, outstanding weatherability, and superior mechanical performance.

The product is suitable for medium- and low-temperature bonding applications, bridge and construction bonding systems, weather-resistant anti-corrosion coatings, insulating heat-resistant electrical components, and protective coatings for machinery and industrial equipment.

The coating is UV-curable and can form covalent chemical bonds with substrates through amino functional groups after curing, significantly improving the mechanical strength and adhesion performance of the coating layer. Adhesion can also be further enhanced by adjusting the surface energy compatibility between the coating and substrate.

Suitable Substrates

Applicable for bonding and coating on:

- Carbon steel
- Stainless steel
- Cast iron
- Aluminum alloy
- Titanium alloy
- Heat-resistant alloy steel
- Microcrystalline glass
- Ceramics
- Plastics
- Cement
- Stone materials

Service Temperature

Suitable for:

- Long-term outdoor service below 300°C
- Short-term exposure up to 500°C

The actual heat resistance of the coating system may vary depending on the thermal stability of the substrate itself. The coating also demonstrates excellent thermal shock and heat-cold cycling resistance.

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Coating Properties

Test Item	Specification	Test Method
Appearance	Colorless transparent	GB/T 1721-79
Solid Content	100%	GB/T 1725-2007
Density	1.05 ± 0.02 g/mL	GB/T 6750-2007
Pencil Hardness	≥6H	GB/T 6739-2006
Adhesion	Grade 0	GB/T 9286-1998
Neutral Salt Spray Resistance	＞500 h	GB/T 1771-2007
Water Contact Angle	≥110°	GB/T 26490-2011
Artificial Weathering Resistance	No rust, chalking, or cracking after 3 days; slight discoloration only	GB/T 1865-2009
Dielectric Strength	≥10^5 V/mm	ASTM D149
Electrical Resistivity	≥10^{13} Ω·m	GB/T 35856-2018
Continuous Service Temperature	300°C	GB/T 1735-2009
Maximum Instantaneous Temperature	500°C	—

Basic Application Parameters

Item	Specification	Item	Specification
Solid Content	100%	Volatility	None
Coating Color After Application	Colorless transparent	Curing Method	UV curing
Dry Film Thickness	4–150 μm	Curing Time	~0.5 min
Reactive Diluents	HDDA, TPGDA, or compatible polysilazane grafted diluents	Recommended Application Temperature	25–90°C
Pot Life	Unlimited without UV exposure	Flash Point	＞90°C
Storage Temperature	0–35°C	Viscosity	500–1000 mPa·s
Appearance	Colorless transparent liquid (slightly hazy in some cases)	—	—

Notes: This resin is a solvent-free system and can generally be sprayed directly under standard spray-gun airflow conditions without dilution. If dilution is necessary, only the dedicated reactive diluents supplied or recommended by our company should be used.

Special Instructions

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This product is a one-component UV-curable material. During storage and application, it must be protected from ultraviolet exposure.

Avoid exposure to:

- Direct sunlight
- Window-side UV exposure
- Fluorescent lighting with UV output
- Other strong UV environments

For best performance:

- Apply in a single coating pass whenever possible
- Recommended dry film thickness should not exceed 150 µm
- Excessive thickness may reduce coating performance

Standard Application Procedure

Surface Cleaning → Surface Roughening → Cleaning & Air Blowing → SIO-9261 Spraying → UV Curing

UV Curing Procedure for the Coating

1. Defoaming

After spraying, place the coated panel horizontally to allow bubbles to dissipate naturally. Any remaining bubbles may be manually removed if necessary.

2. UV Pre-Curing

Place the coated substrate flat inside the UV curing equipment:

- Initial irradiation distance: ＞15 cm
- Irradiation time: 1 minute

After preliminary curing, inspect the hardness. If additional curing is required:

- Adjust irradiation distance to approximately 3 cm
- Irradiate for another 1 minute

3. Recommended UV Lamp Specifications

- Main wavelength: 365 nm or 405 nm; Recommended lamp power: 2 kW

Process Instructions

1. Surface Roughening

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Before coating, sand or sandblast the substrate surface to remove rust, dust, contaminants, and oxide scale.

Surface preparation greatly influences coating performance.

Recommended surface cleanliness:

- Optimal: Sa3
- Minimum: St3 without oxide scale

2. Cleaning

Use dedicated cleaning agents or degreasers to remove residual oil, dust, and contaminants.

3. Substrate Drying

Ensure the substrate surface is clean and completely dry before coating.

4. Resin Mixing

The system consists of resin and photoinitiator.

Recommended mixing ratio:

- Resin : Photoinitiator ≈ 100 : 3–4

Mix thoroughly and filter through a 120-mesh filter before use.

Important: Mixing and filtration must be performed under light-protected conditions.

5. Coating and Bonding

Apply the material onto the bonding surface and perform UV curing. After curing, the coating surface exhibits hydrophobic and oleophobic properties.

Storage Instructions

1. Store according to national regulations in a dry, cool, and well-ventilated environment away from heat and ignition sources.
2. Keep containers tightly sealed.
3. Recommended storage temperature: 5–35°C.
4. Shelf life: 12 months from production date.
5. Unused material should be resealed immediately after use.
6. Mixed but unused material should be stored in opaque sealed containers away from light, such as black plastic containers.
7. Contaminated or unrecoverable materials should be disposed of according to local regulations.
8. Expired products may only be used after passing quality inspection.

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SIO-9915 Polyborosilazane Resin

Product Description

SIO-9915 is a high-performance polyborosilazane (PBSZ) ceramic precursor resin. Through pyrolysis conversion, this material can be transformed into silicon boron carbon nitride (SiBCN) composite ceramics, serving as an important precursor for advanced inorganic ceramic materials.

With the introduction of boron (B), PBSZ can generate stable B–N and B–C–N structures during the ceramic conversion process. Together with the Si–N network, these structures form a highly stable inorganic ceramic framework. The resulting SiBCN ceramics exhibit excellent high-temperature thermal stability, oxidation resistance, creep resistance, and thermal shock resistance, maintaining structural integrity even under extreme temperature conditions. Therefore, SiBCN ceramics are considered one of the promising next-generation ultra-high-temperature ceramic materials.

SIO-9915 exhibits excellent electrical insulation properties, oxidation resistance, gas barrier performance, and radiation resistance, making it suitable for advanced ceramic coatings, electronic component protection, sealing and protective materials, gas barrier films, and aerospace high-temperature protection applications.

Product Features and Applications

SIO-9915 can be used as a ceramic precursor coating material, organic-inorganic hybrid coating resin, and high-temperature protective coating binder.

After curing and high-temperature ceramic conversion, SIO-9915 forms a dense SiBCN ceramic protective layer with the following properties:

- Excellent high-temperature resistance
- Good oxidation resistance
- Excellent corrosion resistance
- Good hydrophobic properties
- Good chemical resistance
- Excellent electrical insulation performance
- Excellent gas barrier properties

The cured coating demonstrates excellent resistance to alcohols, ketones, and various organic solvents.

Typical Applications:

- High-temperature protective coatings
- Ceramic coatings
- Inorganic heat-resistant coatings
- Metal corrosion protection coatings
- Electrical insulation protection for electronic components

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- Aerospace composite material protection
- High-temperature sealing and barrier materials
- Ceramic matrix composites (CMC)

Main Performance Characteristics

Test Item	Performance
Appearance	Light yellow to colorless transparent liquid
Solid Content	＞75%
Viscosity (Ford Cup No.4)	11–20 s
Density	0.95–1.05 g/cm³
Pencil Hardness	6–9H
Adhesion	Grade 0
Dielectric Strength	≥105 V/mm
Volume Resistivity	$\geq 10^{13}$ Ω·m
Salt Spray Resistance	＞3000 h
Artificial Weathering	No rusting, chalking, cracking, or discoloration after 30 days
Wear Resistance after Nitrogen Ceramic Conversion	5000 cycles without substrate exposure

Applicable Substrates

SIO-9915 is suitable for various inorganic and metal substrates, including:

- Carbon steel
- Stainless steel
- Cast iron
- Aluminum alloys
- Titanium alloys
- High-temperature alloys
- Glass ceramics
- Ceramic materials
- Cement-based materials

Different substrates and service conditions require optimized formulations and curing processes. The coating system can be adjusted according to specific application requirements.

Temperature Performance

Air-Cured Conditions

Suitable for:

- Outdoor protective applications

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- Long-term service temperatures ≤350℃
- Short-term exposure to temperatures up to 500℃

Ceramic Conversion Under Inert Atmosphere

After high-temperature ceramic conversion under inert atmospheres such as nitrogen, SIO-9915 forms a SiBCN ceramic structure suitable for:

- High-temperature environments ≥550℃
- Short-term operation at 700℃

The final temperature resistance depends on substrate type, coating thickness, ceramic conversion process, and actual service conditions.

Basic Application Parameters

Item	Parameter	Item	Parameter
Coating Solid Content (%)	＞75	Volatility	Solvent evaporation
Theoretical Coverage (m^2/kg)	8–15	Air Curing Temperature (℃)	Room temperature–220
Dry Film Thickness (μm)	15–30	Air Curing Time (h)	＞24 / ＜1
Pot Life (h)	4	Nitrogen Ceramic Conversion Temperature (℃)	＞600
Diluent	Alkanes, esters, ethers, etc.	Nitrogen Curing Time	Controlled heating profile
Flash Point (℃)	＜22 (solvent flash point)	Storage Temperature (℃)	0–25

Special Notes:
This product is a single-component self-curing material. Once taken out of the container, the coating should be used within 4 hours. For extended application intervals, all tools should be cleaned properly to prevent cured material buildup.

It is recommended to complete the coating application in one pass. The dry film thickness should not exceed **30 μm**, otherwise coating performance may be reduced.

Standard Surface Preparation and Application Process

Surface Cleaning → Surface Roughening → Cleaning and Drying → Coating Application → Curing

Process Details

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1. Surface Roughening Treatment

Before coating, the substrate surface should be sanded or grit blasted to remove rust, dust, contaminants, and loose materials.

Surface preparation has a significant impact on coating performance:

- Recommended: **Sa2.5**
- Minimum requirement: **St3 without oxide scale**

2. Cleaning

Use suitable cleaning agents or degreasers to remove oil, dust, and other contaminants remaining after surface treatment.

3. Substrate Drying

Ensure the substrate surface is completely clean and dry before application.

4. Coating Preparation

This product is a single-component system. Filter the required amount through a **120-mesh filter** before use.

5. Coating Application

For laboratory spraying, a **1.0 mm spray nozzle** provides better coating appearance and uniformity.

After curing, the coating exhibits certain hydrophobic and oleophobic properties; therefore, repeated recoating is not recommended.

6. Curing

- Room-temperature curing: complete curing time >24 hours
- Accelerated curing: 85–180℃ heating can shorten curing time
- Nitrogen atmosphere ceramic conversion: requires controlled temperature ramping according to the curing profile

Storage Conditions

1. Store according to applicable regulations. Keep in a dry, cool, and well-ventilated area away from heat sources and ignition sources. Containers must remain tightly sealed and handled carefully.
2. Recommended storage temperature: **5–25℃**. Shelf life: **12 months**.
3. After opening, unused product must be resealed tightly.
4. Mixed or prepared unused coating should not be returned to the original container and must be disposed of according to local regulations.
5. Products beyond the shelf life should only be used after passing performance evaluation.

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SIO-9333 Perhydropolysilazane Resin (PHPS)

Product Description

SIO-9333 is a high-performance liquid coating material based on Perhydropolysilazane (PHPS) resin as the main component, diluted and stored in a compatible organic solvent. It forms a uniform, transparent coating that can be easily applied to a variety of substrates, including metals, ceramics, and polymers. Upon curing, it converts into a dense, durable SiO_2 layer, offering excellent thermal stability, chemical resistance, and mechanical strength. This versatile material is suitable for applications requiring high-performance protective and functional coatings in challenging environments.

Product Features

- Excellent solubility
- Short curing time
- Multiple curing methods
- Strong adhesion to metals, ceramics, and polymer substrates
- Can be converted to SiO_2 at relatively low temperatures

Technical Parameters

Item	Specification
Appearance	Colorless, transparent liquid
Solid Content	20%
Solvent	n-Butyl ether
Density (liquid state)	1.16–1.31 g/mL
Density (after curing)	1.6–2.0 g/mL

Curing Mechanism

The curing of this coating material mainly proceeds through the hydrolysis of Si–N bonds, gradually transforming the polysilazane structure into a dense SiO_2-based network.

Curing Conditions

- Room temperature curing: More than 7 days
- Moisture curing: 90% humidity, 150 °C, 2 hours

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Coating Performance

Property	Performance
Composition	SiO_x
Coating thickness (nm)	>100
Hardness (GPa)	3 (ammonia curing) / 8–10 (high-temperature curing)
Elastic modulus (GPa)	60 (ammonia curing) / 100–130 (high-temperature curing)
Pencil hardness	9H (Zhonghua) / 6H (Mitsubishi)
Transparency (visible light)	>90%
Adhesion (cross-cut test)	Class 0
Heat resistance (air)	Up to 800 °C
Corrosion resistance	Excellent rust prevention; strong resistance to alkali and salt water
Acid resistance	Relatively weak in 10% HCl, approx. one month

Application Fields

- Anti-graffiti coatings for buildings
- Corrosion protection for precious metals
- Rail transit systems
- Semiconductor insulating layers
- Electronic circuits
- Gas and moisture barrier coatings for plastic packaging
- High-temperature oxidation-resistant coatings for metals
- Surface hardening coatings

Packaging

Packaged in sealed metal containers ranging from 0.5 to 10 liters according to customer requirements. Common filling solvents include xylene, dibutyl ether, or dichloromethane, with solid content adjustable from 2% to 20%.

Application Method

The substrate surface should be thoroughly cleaned before application. The coating can be applied by spin coating, wipe coating, spray coating, or dip coating, followed by room-temperature curing or high-temperature curing as required.

Storage Life

- Unopened: Shelf life of one year
- After opening: The usable period depends on protective measures. When sealed and stored in a dry, low-temperature environment, the usable life exceeds six months.

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