2025

SILICONE MICROSPHERES

SIO New Material

Guangzhou SIO New Material Co., Ltd.

Core-Shell Structured Silicone Microspheres

Core-shell structured silicone microspheres are composite microsphere materials consisting of a silicone elastomer core encapsulated by a shell formed through polymerization or grafting with various materials such as silicone resin, acrylic resin, polyurethane, epoxy, or metallic silver. This unique structure combines the flexibility of the core with the functionality of the shell, enabling properties such as abrasion resistance, scratch resistance, smoothness, noise reduction, matting, anti-sticking, toughness enhancement, and flame retardancy. By adjusting the shell material and microsphere morphology (e.g., particle size, elasticity), tactile properties can be precisely tailored, such as silky smoothness, cotton-like softness, or matte texture.

Guangzhou SIO New Materials Co., Ltd (SIOResin®) on the research, development, and production of silicone core-shell micro- and nano-materials. Our product system, through precise particle size control and surface grafting/copolymer modification, provides high-performance solutions across multiple industries.

Guangzhou SIO New Materials Co., Ltd.

Email:sales@sioresin.com

Tel:+86-130-3722-2576

Fax: +86 20 6268 2689

Address: Room 1308, Building 3, Panshan Headquarters

E-Valley, No. 1003 Yayun Avenue, Panyu , Guangzhou, China.

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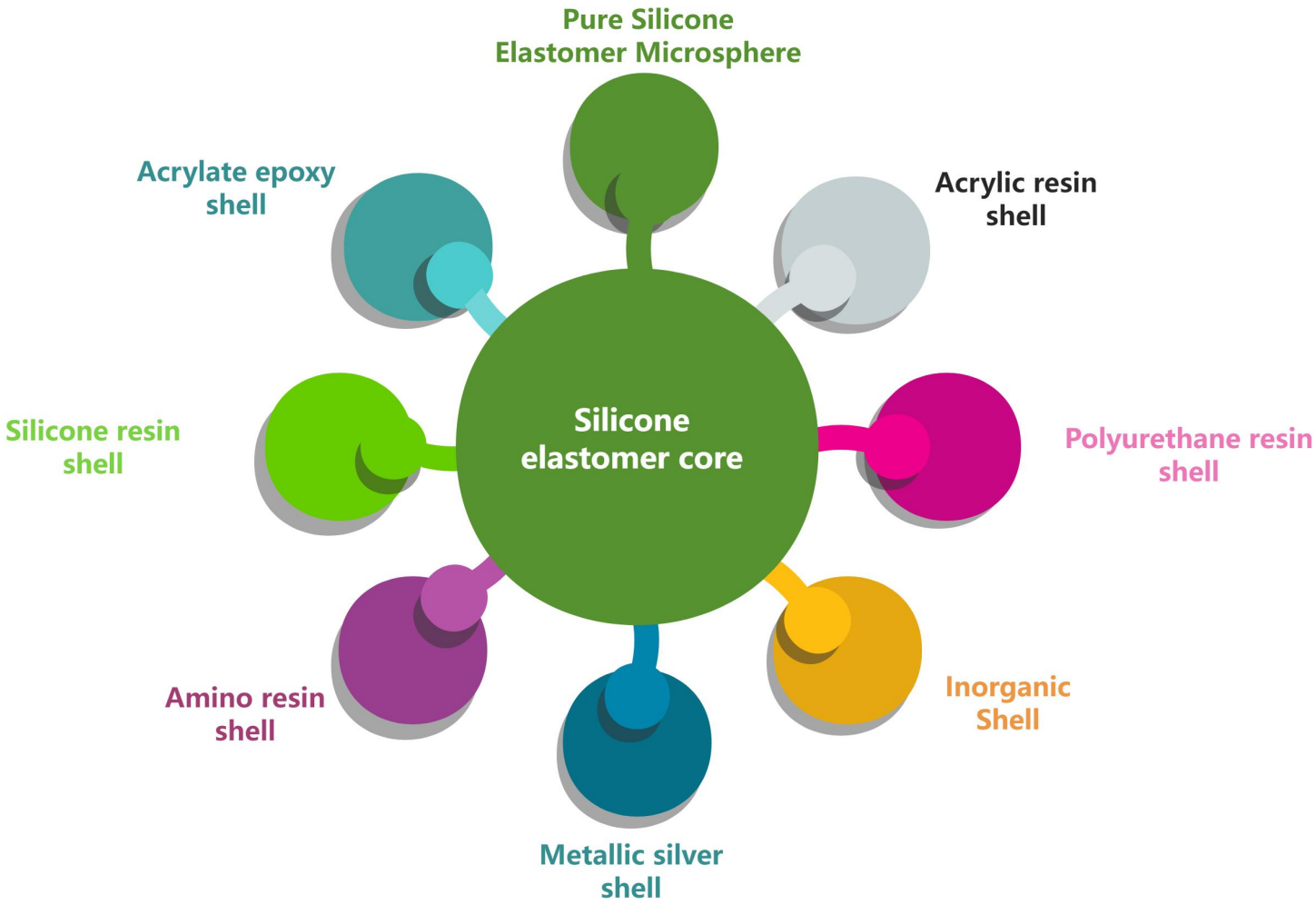


I. Applications in Coatings, Inks, Adhesives, and Leather

In these industries, microspheres are primarily added to modify the physical feel, optical properties, and durability of coatings.

1. Core Function: Enhanced Abrasion and Scratch Resistance
These products significantly improve surface hardness, friction resistance, and scratch resistance.

- **Basic Functional Silicone Microspheres**
  - **Particle Size & Form**: Dry powders ranging from 1.0 µm to 20.0 µm.
  - **Surface Properties**: Can be unmodified hydrophobic for high dispersibility, or grafted with epoxy groups for reactivity.
  - **Features & Applications**: Primarily used for hardening and wear resistance; easy to disperse and add directly.

- **Reactive Silicone Microspheres (High Performance)**
  - **Particle Size & Form**: Dry powder or aqueous dispersions from 3.0 µm to 15.0 µm.
  - **Surface Properties**: Epoxy-grafted surface reacts with active groups in the system to form strong bonds.
  - **Features & Applications**: Provides a silky tactile feel while offering superior abrasion and scratch resistance with improved durability.

- **High-Transparency Scratch-Resistant Series (for Varnish or High-Gloss Systems)**
  - **Particle Size & Form**: Paste (0.5 µm), emulsion (1.3 µm), dry powder (0.3 µm).
  - **Surface Properties**: Some unmodified; some grafted with methacrylate or epoxy groups.
  - **Features & Applications**: High transparency designed for water-based or solvent-based high-gloss systems; maintains gloss while providing scratch and wear resistance. Specifically for water-based varnish, delivering high gloss and smooth touch.

2. Core Function: Specialty Tactile Effects

By varying particle size and surface polymers, a wide range of tactile effects can be achieved.

- **Cotton-Like / Smooth Touch Series**
  - **Particle Size**: 2.0 µm to 50.0 µm.
  - **Surface Properties**: Grafted with methacrylate + epoxy groups.
  - **Features & Applications**: Provides tactile effects from delicate to coarse cotton-like, smooth, or matte; suitable for water-based and solvent-based systems.

- **Smooth Touch Series**
  - **Particle Size**: 2.0 µm to 50.0 µm.
  - **Surface Properties**: Grafted with methacrylate groups.
  - **Features & Applications**: Provides smooth and flexible touch with minimal gloss impact; larger particles yield more matte feel. Optimized for color rendering and transparency.

- **Velvety Skin-Like Series (Polyurethane Grafted)**
  This extensive series provides skin-like comfort through polyurethane surface modification.
  - **Smooth Velvety**: 2.0–15.0 µm; offers smooth velvety touch.
  - **Soft Velvety**: 2.0–30.0 µm; softer tactile feel.
  - **High Color Rendering Soft Velvety**: Optimized for improved color and transparency.
  - **Abrasion-Resistant Soft Velvety**: Enhanced scratch and wear resistance on top of skin-like feel.
  - **Soft-Elastic Velvety**: 2.0–100.0 µm; combines velvety feel with softness and elasticity, premium touch, with wear resistance.

3. Core Function: Matte / Anti-Gloss

- **Silicone Spherical Matting Powder**
  - Particle Size & Form: 3.0 µm–6.0 µm, dry powder or aqueous dispersion.
  - Surface Properties: Mostly epoxy- or polyurethane-grafted; some unmodified.
  - Features & Applications: Provides high-efficiency matting with smooth or skin-like touch; enhances abrasion and scratch resistance; suitable for solvent-based, UV, water-based, and high-solid coatings.

4. Core Function: Special Effects

- **Black Velvety Powder**
  - Surface Properties: Polyurethane grafted.
  - Features & Applications: Provides black smooth or soft tactile effects; mainly for premium touch coatings and can reduce surface light reflection.

II. Applications in Personal Care

Designed for cosmetics with extreme attention to safety and skin feel.

- **Particle Size & Form**: 5.0–12.0 µm, dry powder.
- **Surface & Core Properties**: Pure silicone elastomer, silicone core-shell elastomer, or odor-free polyurethane; some include silica or butanediol for performance enhancement.
- **Features & Applications**: Extremely low odor, silky and smooth skin feel; used in foundations, loose powders, and skincare products to enhance user experience.

III. Applications in Rubber & Plastics

1. Wear Resistance and Friction Noise Reduction

- **Particle Size**: 0.3–6 µm.
- **Surface Properties**: Tailored modifications for different plastics: polyurethane (POM), methacrylate + epoxy (PC), methacrylate + carboxyl (PA nylon), vinyl (silicone rubber).
- **Features & Applications**: Improves wear resistance of components like gears and rails; reduces friction noise. In silicone rubber, enhances reinforcement and smoothness.

2. Anti-Sticking for Films

- **Particle Size**: 5.0–6.0 μm.
- **Surface Properties**: Unmodified or propyl-grafted.
- **Features & Applications**: Prevents film sticking during rolling; non-exuding, maintains printability, avoids film whitening.

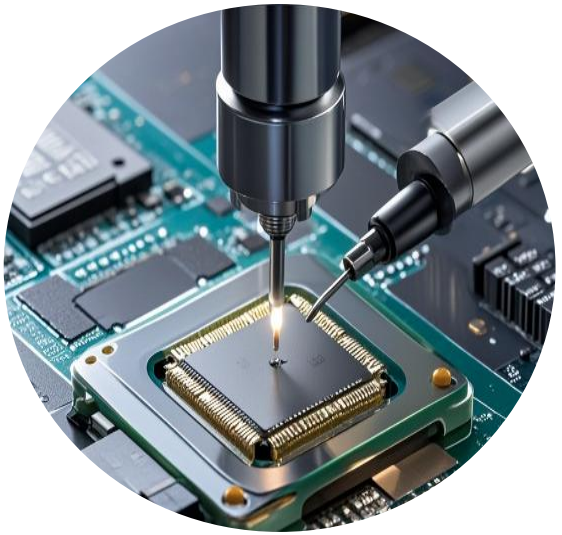
3. Flame Retardancy

- **Form**: Liquid or solid.
- **Properties**: Low-viscosity reactive liquids; some models achieve high transparency.
- **Applications**: Synergistic with inorganic flame retardants like $Al(OH)_3$/$Mg(OH)_2$; improves LOI and vertical burn ratings (UL94). FR series for polycarbonate

IV. Impact Resistance & Toughening Applications

- **Particle Size & Form**: Ultrafine 0.2–0.3 μm dry powder or pre-dispersed epoxy.
- **Surface Properties**: Grafted with methacrylate, carboxyl, or epoxy groups for compatibility or reactivity.
- **Features & Applications**: Acts as a core-shell toughening agent for epoxy, phenolic, nylon, and photoresist thermosets; significantly enhances impact strength and toughness, preventing brittle cracking.

V. Conductive & Electromagnetic Shielding Applications.



- **Product Series**: Silver-coated silicone microspheres.
- **Particle Size & Structure**: 1.0 μm (monodisperse) to 50.0 μm (polydisperse), silicone core / silver shell.
- **Features**: Lightweight (2.34–5.45 g/cm³), excellent conductivity (resistivity ~10^{-5} Ω·m).
- **Applications**: Electromagnetic shielding, conductive coatings/adhesives/inks, conductive plastics, anti-static, and antimicrobial applications.

** We have hundreds of products to meet the specific application requirements of different customers. If you can't find a suitable product in the list, please feel free to contact us. We will provide you with the best solution.*

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Email:**sales@sioresin.com**
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