RESIFA™ SOLESPHERE™
Microsphere Silica Gels for
Cosmetic and Skincare
Formulations
Benefits of RESIFA™ SOLESPHERE™ Gels

Benefits for cosmetics and skincare formulations are based on:

- PARTICLE SIZE
- and
- PORE VOLUME
SOLESHERE Benefits Overview

- Absorption
  - Rolling effect improves spreadability
  - Excellent sebum, oil and odor absorption
  - Absorption removes sebum and abrasiveness removes dirt

- Oil Removal/Exfoliation

- Spreadability
  - Light scattering creates a soft focus effect

- Soft Focus

Your Dreams, Our Challenge
The SOLESHERE Product Family

- Oil Absorption Capacity (ml/100g)
  1: 150 mL/100 g
  2: 300 mL/100 g
  3: 400 mL/100 g

- Particle Diameter (μm)
- H – high surface area
- L – low surface area
- NP – nonporous

Your Dreams, Our Challenge
Spreadability
Factors Affecting Spreadability

**HARDNESS**
- Silica is a very hard material, and it is difficult to deform like plastic bead fillers.
- Silica has less slip resistance and friction than plastic bead fillers.

**SHAPE**
- The more spherical the particle shape, the better the slip and feel.

**SPECIFIC GRAVITY**
- The lower the specific gravity, the easier it is to spread.

*These factors affect slip properties far more than surface smoothness.*
Soft Touch Feel of SOLESPHERE vs. Plastic Beads

**PLASTIC BEADS**

- Plastic beads are soft, so they can deform when touched.
- This increases the contact and frictional force between the beads.

**SOLESPHERE MICROSPHERES**

- Silica beads are hard and do not deform. They are spherical, which improves rolling.

• = Nano-sized particles (ZnO, etc.)
• SOLESPHERE silica microspheres roll easily.

• Rolling effect minimizes friction.

• Low friction increases elongation and improves touch and spreadability.
Comparison with Plastic Bead Fillers

SOLESPHERE provides higher slipperiness and smoothness.

MIU ratio

MMD ratio

application quantity 2.0 mg/cm²

$t$-test $^*P < 0.05$
Soft Focus Effect
What is Soft Focus?

- The scattering of light caused by a particle’s porosity provides a soft focus effect.
- This property effectively hides wrinkles, producing an antiaging effect.
Principle of Soft Focus

Full Transmitted Light
Full transmitted light = diffused light + parallel transmitted light

Full Light Transmission Rate
Full light transmission rate = refracted light / (diffused light + parallel transmitted light)

Haze
Haze = diffusion transmittance / full light transmittance
## Factors That Affect Soft Focus

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>PARTICLE SIZE</strong></td>
<td>The smaller the particle size, the greater the light scatter</td>
</tr>
<tr>
<td><strong>SHAPE</strong></td>
<td>The greater the aspherical shape, the better the light scatter</td>
</tr>
<tr>
<td><strong>SPECIFIC GRAVITY</strong></td>
<td>The lower the specific gravity, the easier to spread and the higher the light scatter.</td>
</tr>
<tr>
<td><strong>POROSITY</strong></td>
<td>The higher the porosity, the better.</td>
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**SOLESHERE is an ideal choice for soft focus.**
Differences in Soft Focus Due to Lighting

**FULL LIGHT TRANSMISSION RATE**

- High transmission rate → High transparency
- Low transmission rate → Low transparency and whitish finish

**HAZE**

- High haze → High soft focus and a higher effect of hiding wrinkles
- Low haze → No soft focus and not as effective at hiding wrinkles

High light transmittance and high haze causes the most effective wrinkle-concealing effect.
Testing Soft Focus

Test procedure

• Each powder and KF-7312J was dispersed at a ratio of 1:9

• Coating film was prepared:
  ○ Coating at 90 seconds at 50 °C
  ○ Spin coated at 500 rpm for 90 seconds
  ○ Dried for 30 minutes
Sebum, Oil and Odor Absorption
Influence of Sebum on Cosmetics

As sebum secretion accumulates, two things happen:

1. Light reflection is reduced and shiny spots form
2. Too much sebum causes makeup to collapse/break up

Sebum secretion causes shiny spots and makeup deterioration.
SOLESPHERE gel particles capture sebum, oil and fragrances in their pores.

Absorbing Sebum and Oil

Without SOLESHERE, the fragrance is released and does not stay on skin.

With SOLESHERE, the fragrance stays on the skin surface longer and absorbs sebum.
Absorbing Sebum and Oil

The larger the pores, the more sebum, oil and odor are absorbed.

NP Series
NP-30
NP-100
NP-200

1 Series
H-31
L-31
H-51
H-121
H-201

2 Series
H-32
H-52
H-122

3 Series
H-33
H-53
H-122

Your Dreams, Our Challenge
SOLESPHERE Absorbs Sebum

SOLESPHERE’s high pore volume can absorb considerable sebum, which prevents shine and helps makeup last longer.
When compared with plastic beads, SOLESPHERE microspheres better prevented shiny spots from forming.
Results of Gloss and Matte Effect Testing

- Adding SOLESPHERE to a formulation decreases its glossiness.
- SOLESPHERE can provide a matte effect for cosmetic formulations.
Exfoliation Properties
• SOLESPHERE effectively absorbs sebum and oil.

• SOLESPHERE effectively removes dirt with abrasion.
Advantages of Using SOLESPHERE Silica Scrub

- Environmentally friendly
- Safe to use
- Good replacement for plastic bead fillers

Concentration 1%-3% D-200L, 300L
Encapsulation and Matte Effects

**Encapsulation**

Fragrance → Absorption → SOLESPHERE Particle → Release

**Matte effect**

Formulation with SOLESPHERE gel vs. Formulation without SOLESPHERE gel

Control vs. H-53

Your Dreams, Our Challenge
• A 1 mg/cm² lipstick formulation sample was applied to a BIOSKIN plate.
• Density = 1.0 mg/cm²
• Thickness: 10 μm*
• PG-1M glossmeter** measured shine at 20°, 60° and 85° angles.

**Nippon Denshoku Industries Co., Ltd.
Conclusions

- SOLESPHERE gels improve smooth feel, application and spreadability of skin care formulations.
- SOLESPHERE gels impart a soft focus effect.
- SOLESPHERE gels absorb sebum, oil and odor.
- SOLESPHERE gels can be used to enable exfoliation, impart matte effects and encapsulate fragrances.
Haze and Total Transmittance of SOLESPIHERE Grades

The higher the particle size, higher the blur effect and the amount of oil absorption.