



# Cosmetic Microspheres

## Formulation Advantages

### Talking Points

#### Insolubility

Based on experience gained in attempting to dissolve the microspheres for compositional analysis, ceramic microspheres are expected to be insoluble in virtually any cosmetic formulation.

#### Non-porosity

The nonporous nature of the microspheres minimizes the interaction with other formulation ingredients, and allows maximum loadings with minimized viscosity increase.

#### “Ball-bearing” feel

Improved glide and slip, as well as omnidirectional spreadability.

#### Economical value

The efficient manufacture of 3M cosmetic microspheres allows for higher production rates, leading to reduced costs.

#### High bulk density

This permits the addition of the filler pigments at significant levels, with minimal viscosity increase.

#### High loading levels

The CM-111 microspheres function as an “invisible” filler—useful in formulating deep color shades in which the chalky, whitening effect of many ingredients is a disadvantage. This “invisibility” allows for use of the material at higher loading levels.

#### Inertness

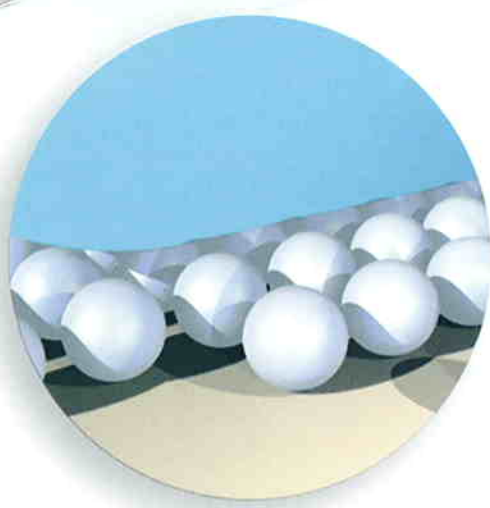
3M cosmetic microspheres are inert, both chemically and physically. Besides the non-reactivity with other components in a formulation, they possess excellent processability.

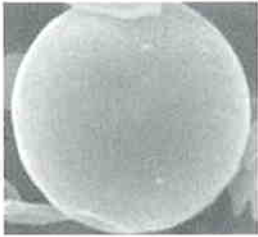
#### “Soft Focus” Effect

These semi-transparent spheres will scatter light in all directions, producing soft focus effects.

#### Crystalline-Free Silica

A sample of CM-111 microspheres was submitted to a laboratory to determine whether crystalline silica was present. The percentage of quartz particles (as measured by polarized light microscopy) was less than 0.007%.

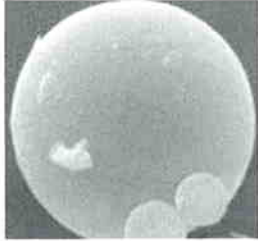




Initial



1X



2X

## Advantages for Lipsticks

Fillers are used in lipsticks to improve wear, particularly bleeding and feathering reduction. It is important that the fillers used do not cause brittleness or crumbling of the poured lipsticks.

## Excellent processability

In a laboratory test, CM-111 microspheres were passed through a typical cosmetic processing mill twice. As can be seen in these photos from a Scanning Electron Microscope (SEM), the microspheres were not altered, despite repeated milling, and exhibit excellent shear resistance.

## Particle size

This is primarily a function of the size of the raw material input, an irregular-shaped inorganic powder.

By carefully choosing the input particle size range, the desired spherical particle size can be obtained. A typical ceramic microsphere size distribution might be as shown: 90% of the particles of 10 microns size or less; 50% of 5 micron or less; and 10% of 2 micron or less.

Spherical particles under 10 microns in size are in the range in which skin feel is excellent, due to the "ball bearing" effect; yet there is no sensation of individual particulates.



## Comparative Test Results

In a series of lab tests, a comparison was made between a generic formulation with 8% 3M cosmetic microspheres CM-111 (#1), one having 8% PMMA beads (#2), and one without filler (#3).

Lipsticks #1 and #2 were stable at 50° C; that is, no syneresis (or sweating) and no drooping occurred. The lipstick without filler (#3) was unstable, exhibiting sweating at 50° C.

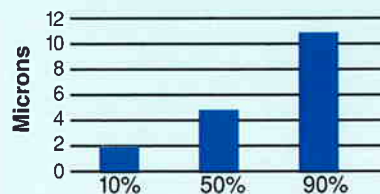
A dart penetration test was performed to determine how deeply a dart would penetrate into each lipstick. Penetration results were:

- #1: 7.6mm
- #2: 6.2 mm
- #3: 5.6mm

For equal stability, the highest penetration number would indicate the lipstick which would deliver the best payoff to the lips. Formulation #1, the lipstick containing the 8% CM-111 microspheres, exhibited the best delivery of the lipstick to the lips.

When the lipsticks were applied to the lips, the product without filler (#3) was hard and greasy, with the worst wear. Due to the higher oil absorption, the lipstick containing PMMA (#2) was harder and drier on application. In this series of experiments, the addition of 8% CM-111 microspheres (#1) resulted in a creamy formula that applied easily, but did not creep or bleed beyond the lip outline.

3M™ CM-111 Particle Size



## Advantages for Cream Powder Foundation



**Maximum pigment load**—When formulating cream powder systems, particularly those having no volatile solvent, the objective is to maximize the pigment load. This can be obtained through the utilization of pigments and fillers that wet well and have the lowest possible oil absorption.

Materials used should have good slip to augment the “powdery” tactile impression. The low oil absorption of the CM-111 microspheres make them ideal for achieving high filler loads.

### Comparative Test Results

Shown below are some of the results of tests comparing the performance of a generic formulation containing 15% CM-111 microspheres and one containing spherical Nylon-12. All pigments and fillers were treated with a caprylyl silane to increase lipophilicity, thus enhancing the wetting in the anhydrous system.

Due to the lower oil absorption, melt viscosity at 70°C of the formulation containing CM-111 microspheres was 165 centipoises versus 310 centipoises for the formulation containing Nylon-12. The 165 cps hot melt flowed freely, permitting a simple gravity fill without the need to vibrate or reheat the filled pans.

The formula with the CM-111 microspheres exhibited a nice smooth feel with good spreadability; the one with Nylon-12 had a dry and draggy feel, showing the benefit of using a low absorbing filler.

## Advantages for Eyeshadow



In another series of lab tests, two eyeshadows were formulated: one containing 21.5% CM-111 microspheres and one containing 10% boron nitride. It is important to note that, even though CM-111 microspheres are added at twice the amount of boron nitride, the overall cost of filler for the CM-111 eyeshadow formulation would be less expensive than the one containing boron nitride.

### Comparative Test Results

When the eyeshadow samples were gently stroked with the finger, the formulation containing CM-111 microspheres provided a softer, smoother skin feel with greater “slip.” (Note: To make it easier to differentiate the feel between the two eyeshadows, it can help to stroke each one simultaneously with different fingers.)

If the customer has difficulty telling the difference in feel between the two samples, there is still an advantage of using the CM-111 formulation, because CM-111 as a filler costs less overall.

Distributed By

**BRENTAG**  
SPECIALTIES

<b>Southeast</b> Norcross, GA 800.833.8142	<b>Northeast</b> S. Plainfield, NJ 800.732.0562	<b>West</b> Laguna Hills, CA 800.843.1935
<b>Midwest/Canada</b> Plainfield, IL 800.833.8140	<b>Northeast</b> Philadelphia, PA 800.423.7423	<b>Southwest/Mexico</b> Houston, TX 800.627.2436

**United States**

3M Specialty Materials  
3M Center, Building 223-6S-04  
St. Paul, MN 55144-1000  
800 541 6752  
800 810 8514 (Fax)

**Europe**

3M Specialty Materials  
3M Belgium N.V.  
Haven 1005, Canadastraat 11  
B-2070 Zwijndrecht  
32 3 250 7874

**Canada**

3M Canada Company  
Specialty Materials  
P.O. Box 5757  
London, Ontario  
N6A 4T1  
800 364 3577

**Japan**

Sumitomo 3M Limited  
33-1, Tamagawadai 2-chome  
Setagaya-ku, Tokyo  
158-8583 Japan  
813 3709 8250

**Asia Pacific and  
Latin America**

Call (U.S.) 651 736 7123

**Important Notice to Purchaser:** The information in this publication is based on tests that we believe are reliable. Your results may vary due to differences in test types and conditions. You must evaluate and determine whether the product is suitable for your intended application. Since conditions of product use are outside of our control and vary widely, the following is made in lieu of all express and implied warranties (including the implied warranties of merchantability and fitness for a particular purpose): Except where prohibited by law, 3M's only obligation and your only remedy, is replacement or, at 3M's option, refund of the original purchase price of product that is shown to have been defective when you received it. In no case will 3M be liable for any direct, indirect, special, incidental, or consequential damages (including, without limitation, lost profits, goodwill, and business opportunity) based on breach of warranty, condition or contract, negligence, strict tort, or any other legal or equitable theory.



**3M Specialty Materials**

3M Center, Building 223-6S-04  
St. Paul, MN 55144-1000

www.3m.com/cosmeticsolutions

Issued: 4/03

© 2003 3M

4486 (HB)  
MCS0351730  
98-0212-2676-0