Examples of Hair Benefits from Application of Innospec Silicones

- Blow drying time reduction to reduce hair damage.
- Thermal protection.
- Enhanced shine.

Dr. Tony Gough
Enhancing Blow Drying: Styling Time Reduction to Reduce Hair Damage

Shineblend® 9503
Consumers Desire Hair Damage Protection

► There is a demand by consumers for products that reduce hair damage caused by styling appliances (blow dryers, curling irons, flat irons, etc).

► In the blow drying process, heated blow drying causes thermal damage and combing during the process causes further hair damage.

► Faster blow drying reduces the blow drying time and thereby reduces the potential of hair damage.
Shineblend® 9503

- Cyclopentasiloxane (and) Dimethicone/Vinyl Dimethicone Crosspolymer (and) Dimethiconol (and) PEG-10 Dimethicone

- Product Benefits:
  - Thermal protection
  - High gloss /shine
  - Softens, detangles and smooths
  - Frizz control
  - Rich application feel
Test Protocol

Objective
► Evaluate Shineblend® 9503 for reduction of blow drying time versus commercial products and as an additive to commercial products.

Procedure
► Bleached hair tresses, 15.2 cm in length, weighing approximately 2 grams each, were used to demonstrate drying time improvement (reduction).
► Tresses were pre-washed with 10% SLES-2, blow dried and combed.
► Dry untreated tresses were weighed and the weight was recorded. The same tresses were wetted, excess water drained and re-weighed and the weight was recorded.
► Tresses were blow dried and weighed at 1 minute intervals until the original weight was achieved.
► Using the same tresses, the tresses were re-wetted, excess water drained, treated with 1 ml of the test formulations, re-weighed and the weight was recorded.
► Tresses were blow dried and weighed at 1 minute intervals until the original weight was achieved.
Results

Drying Time Improvement

<table>
<thead>
<tr>
<th>Commercial A</th>
<th>Commercial B</th>
<th>Commercial C</th>
<th>Commercial A &amp; 5% SB 9503</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclopentasiloxane, Dimethicone, Dimethicone Crosspolymer, Dimethicone/Vinyl Dimethicone Crosspolymer, Dimethiconol, PEG-10 Dimethicone, Argania Spinosa (Argan) Kernal Oil, Simmondsia Chinensis (Jojoba) Seed Oil, Sodium Laneth 40 Maleate/Styrene Sulfonate Copolymer, Fragrance</td>
<td>Cyclopentasiloxane, Dimethicone, Bambusa Arundinacea Stem Extract (Extract), Citrus Grandis Fruit Extract (Extract), Glycine Soja Extract (Extract) Lonicera Japonica Flower Extract (Extract), Phenyl Trimethicone, Cyclohexasiloxane, Dimethiconol, Dimethicone Crosspolymer, fragrance, Benzyl Benzoate, Butylphenyl Methylpropional, Benzyl Salicylate, Hydroxyisohexyl 3-cyclohexene Carboxaldehyde, Hydroxycitronellal, L-limonene</td>
<td>Water, Cetearyl Alcohol, Cyclopentasiloxane, Cetyl Alcohol, Behentrimonium Chloride, Amodimethicone, Olea Europaea Fruit Oil, Stearamidopropyl Dimethylamine, Dimethicone, Glycerin, Fragrance (Parfum), Dimethiconol, Isopropyl Alcohol, Guar Hydroxypropyltrimonium Chloride, Ceteareth-20, Citric Acid, Panthenol, Dipropylene Glycol, Cetrimonium Chloride, Trideceth-12, Disodium EDTA, Hydrolyzed Keratin, Polyquaternium-7, Methylchloroisothiazolinone, Methylisothiazolinone</td>
<td></td>
</tr>
</tbody>
</table>
Summary of the Results

► Shineblend® 9503, as supplied, provides significantly improved (reduces) blow drying time.

► Shineblend® 9503 added to commercial formulations, can also enhance / reduce the blow drying time.

► Shineblend® 9503 can be used as supplied for spray applications or thickened with Gelaid CPDP to the desired viscosity.

► Small amounts of essential oils can also be added to the spray and serum formulations.
# Quick Dry Serum CRL-029-146

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Wt%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gelaid® CPDP-CF</td>
<td>80</td>
</tr>
<tr>
<td>Isododecane</td>
<td>10</td>
</tr>
<tr>
<td>Shineblend® 9503</td>
<td>10</td>
</tr>
</tbody>
</table>

**Procedure:** Mix together ingredients in order.

- **Appearance:** Clear Liquid
- **Viscosity @ 25°C:** 1200 – 2000 cPs
Thermal Damage Protection using Gelaid® CPDP and Gelaid® CPDP-CF
Protecting Hair from Thermal Styling

- Hair Damage from thermal insult with styling appliances, such as hot flat irons, is a concern to consumers.
- Temperatures can exceed 200°F / 93°C and up to 450°F / 232°C
- There is a need for protective ingredients and products which protect hair during the styling process.

Methods of detecting thermally induced hair damage:
- Surface measurement/examination – Coefficient of friction, SEM
- Mechanical properties – Stress-strain studies
- Fatigue failure – Resistance to breaking
- Other techniques – FTIR Imaging, DSC, water vapor sorption
Methods and Materials

Hair Tresses

European dark-brown hair (International Hair Importers)

Tresses were cut to 1.3 cm wide and 16.5 cm in length. Each tress weighs approximately 3 grams.

All tresses were washed with 10 % SLS and dried with a hair dryer set on medium heat (60°C).

Equipment

Diastron® MTT FRICTION KIT: Used to measure the friction force between the hair and a standard rubber probe. The total applied gram-force load (vertical) is 200 grams.

Flat Iron – CONAIR 1.5 inch wet dry Tourmaline Ceramic Straightener
Diastron MTT Friction Kit
Methods and Materials

Procedure

A control hair tress (no pretreatment) was clamped on the moving platen of the MTT Friction Kit.

Friction force was measured as the standard probe moved on a hair tress at a constant rate of 150 millimeters per minute.

For the results shown in this presentation, the data of Coefficient of Friction (CoF) measured only against the cuticle (rather than in the direction of the cuticle) were used as these showed the largest difference between the CoF of the untreated/un-ironed tresses versus that of the untreated ironed tresses.

Five replicate readings were recorded and the mean CoF was calculated.

This was the baseline friction reading which was recorded for each hair tress before treatment with product and/or styling with a flat iron.
Methods and Materials
Procedure cont.

Untreated hair tresses were hot flat ironed at controlled 25 second intervals. A total of 15 intervals were used. This was one cycle. Friction force was measured again and recorded.

After each cycle, and before final readings, each hair tress was washed using 10% SLS to eliminate product contamination to friction values. This procedure was repeated for three cycles.

All untreated controls and treated hair tresses were evaluated in the same manner before and after treatment. The CoF of hair treated with commercial products was compared with those values of untreated hair subject to hot flat iron styling.

Untreated ironed hair has a reduction in CoF due to flattening deformation/damage of the cuticle scales.
# Coefficient of Friction Results

**Commercial Products / Flat Iron at 400°F / 204°C**

<table>
<thead>
<tr>
<th>Product</th>
<th>Mean Untreated CoF (Before Heat)</th>
<th>Mean Untreated CoF (After Heat)</th>
<th>% Change in CoF</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated Control Tresses</td>
<td>1.07</td>
<td>0.65</td>
<td>-30%</td>
<td>Significant Change*</td>
</tr>
<tr>
<td>Commercial A</td>
<td>1.02</td>
<td>1.02</td>
<td>0%</td>
<td>No Change</td>
</tr>
<tr>
<td>Commercial B</td>
<td>1.03</td>
<td>0.98</td>
<td>-5%</td>
<td>No Significant Change</td>
</tr>
<tr>
<td>Commercial C</td>
<td>0.97</td>
<td>0.99</td>
<td>3%</td>
<td>No Change</td>
</tr>
<tr>
<td>Commercial D</td>
<td>1.04</td>
<td>0.99</td>
<td>-5%</td>
<td>No Significant Change</td>
</tr>
</tbody>
</table>

* Decrease in coefficient of friction is due to the flattening of the hair cuticles caused by excessive heat.

Hair is protected from damage (flattening of the cuticles) when there is no change in CoF.

---

**Commercial A**
Cyclopentasiloxane, neopentyl glycol diethylhexanoate, diisopropyl sebacate, diisopropyl adipate, fragrance(parfum), water (aqua, eau), limonene, hexyl cinnamal, linalool, geraniol, tocopheryl acetate, ethylhexyl methoxycinnamate, bht.

**Commercial B**
Water, amodimethicone, glycerin, PEG-12 dimethicone, propylene glycol, PVP, parfum (fragrance), polysorbate 20, cetrimonium chloride, DMDM hydantoin, trideceth-12, benzophenone-4, triethanolamine, disodium EDTA, hexyl cinnamal, benzyl benzoate, limonene, butylphenyl methylpropional, hydrolyzed silk, linalool, citronellol, geraniol, hydroxyisohexyl 3-cyclohexene carboxaldehyde, alpha-isomethyl ionone, ascorbic acid, tocopheryl acetate, panthenol, biotin, niacinamide, lactic acid.

**Commercial C**
Water/Aqua/Eau, Cetearyl Alcohol, Behentrimonium Chloride, Propylene Glycol, Cyclomethicone, Fragrance/Parfum, Panthenol, Silk Amino Acids, Helianthus Annuus (Sunflower) Seed Extract, Camellia Sinensis Leaf Extract, Quaternium-80, Methylparaben, Propylparaben, Eugenol, Coumarin, Cinnamal, Linalool, Methylchloroisothiazolinone, Methylisothiazolinone.

**Commercial D**
aqua, alcohol denat., PEG-40 hydrogenated castor oil, VP/VA copolymer, sodium citrate, phenoxyethanol, Argania spinosa oil, ethylhexylglycerin, polyquaternium-16, polyquaternium-6, xylose, dimethicone PEG-7 phosphate, limonene, linalool, propylene glycol, hexyl cinnamal, amyl cinnamal, parfum.
## Coefficient of Friction Results

### Effect of Flat Iron Temperature

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Temperature</th>
<th>Mean Untreated CoF (Before Heat)</th>
<th>Mean Untreated CoF (After Heat)</th>
<th>Change in CoF / %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated Control Tresses</td>
<td>400 F / 204 C</td>
<td>1.03</td>
<td>0.67</td>
<td>-35</td>
</tr>
<tr>
<td></td>
<td>450 F / 232 C</td>
<td>1.49</td>
<td>1.15</td>
<td>-23</td>
</tr>
<tr>
<td>Commercial A</td>
<td>400 F / 204 C</td>
<td>1.07</td>
<td>0.99</td>
<td>-7</td>
</tr>
<tr>
<td></td>
<td>450 F / 232 C</td>
<td>0.90</td>
<td>0.87</td>
<td>-3</td>
</tr>
<tr>
<td>Anhydrous Blend</td>
<td>400 F / 204 C</td>
<td>1.04</td>
<td>1.03</td>
<td>-1</td>
</tr>
<tr>
<td>Dimethicone (and) Cyclopentasiloxane (and) Dimethiconol (and) C12-15 alkyl benzoate</td>
<td>450 F / 232 C</td>
<td>1.36</td>
<td>1.42</td>
<td>5</td>
</tr>
</tbody>
</table>

Anhydrous Blend containing Dimethicone (and) Cyclopentasiloxane (and) Dimethicone (and) C12-15 alkyl benzoate provides thermal protection
### Gelaid® CPDP and Gelaid® CPDP-CF

<table>
<thead>
<tr>
<th>Feature</th>
<th>Gelaid® CPDP</th>
<th>Gelaid® CPDP-CF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INCI Name</strong></td>
<td>Cyclopentasiloxane (and) Dimethicone (and) Phenyl Trimethicone</td>
<td>Dimethicone (and) Phenyl Trimethicone</td>
</tr>
<tr>
<td><strong>Diluent</strong></td>
<td>Cyclopentasiloxane</td>
<td>Dimethicone</td>
</tr>
<tr>
<td><strong>Appearance</strong></td>
<td>Clear Liquid</td>
<td>Clear Liquid</td>
</tr>
<tr>
<td><strong>Odor</strong></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Viscosity @ 25°C</strong></td>
<td>4500 - 5500</td>
<td>4700 - 5000</td>
</tr>
<tr>
<td><strong>Refractive Index @ 25°C</strong></td>
<td>1.39 - 1.41</td>
<td>1.39 - 1.41</td>
</tr>
<tr>
<td><strong>Specific Gravity @ 25°C</strong></td>
<td>0.95 - 0.96</td>
<td>0.90 - 0.91</td>
</tr>
<tr>
<td><strong>% Non-volatile Content</strong></td>
<td>~ 18%</td>
<td>~ 20%</td>
</tr>
</tbody>
</table>
**Coefficient of Friction Results**
**Flat Iron 450°F / 232°C**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean Untreated CoF (Before Heat)</th>
<th>Mean Untreated CoF (After Heat)</th>
<th>% Change in CoF</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated Control Tresses</td>
<td>1.67</td>
<td>1.03</td>
<td>-38%</td>
<td>Significant Change</td>
</tr>
<tr>
<td>Gelaid° CPDP Treatment</td>
<td>1.40</td>
<td>1.35</td>
<td>-4%</td>
<td>No Significant Change</td>
</tr>
<tr>
<td>Gelaid° CPDP-CF</td>
<td>1.48</td>
<td>1.51</td>
<td>2%</td>
<td>No Significant Change</td>
</tr>
<tr>
<td>Formula CRL-03-80A</td>
<td>1.33</td>
<td>1.32</td>
<td>-1%</td>
<td>No Significant Change</td>
</tr>
</tbody>
</table>

**Formula CRL-03-80A  Silicone in Water Emulsion:**

- Water: 38.85%
- Glycerin: 35.00%
- Butylene Glycol: 5.00%
- Sepigel 305: 3.00%
- Preservative: 0.15%
- Gelaid° CPDP or CPDP-CF: 24.00%
Discussion of Results

- Commercial ‘Heat Protect’ products tested in our laboratory demonstrate the ability to offer protection consistent with product claims.

- Thermally stressing hair increases compacting of the cuticle (1).

- It has also been reported that repeated heating of hair may increase levels of fusion and moderate disintegration at the cuticle edge (2).

- Our study demonstrates a reduction in Coefficient of Friction for untreated hair with progressive thermal exposure. We believe this reduction in CoF is consistent with the flattening and general disintegration of the cuticle edge as previously reported.

- Results show a 30% reduction in CoF (damage) for untreated hair subjected to thermal insult.
Conclusions

- Thermal styling by use of hot flat iron results in damage to dry hair; compression, disintegration and fusion of the cuticle cell occur during this process.

- We have demonstrated that Coefficient of Friction is a good marker for the type of hair damage which occurs with repeated thermal insult.

- A reduction in CoF is consistent with a flattening of the hair surface.

- We also demonstrated that pretreatment with some commercial products which claim ‘heat protection’ is beneficial in reducing thermally induced cuticle damage to hair.
References


(3) S. Marchioretto, S. van Doorn, Silicones offer multifunctional solutions for hair protection, *Dow Corning SA Seneffe, Belgium.*
Enhancing Hair Shine

Shineblend® MAX
Consumers desire greater shine

► There is a growing demand by consumers for healthier looking hair and consumer studies frequently show that hair shine is a popular and key attribute which consumers desire and associate with healthy looking hair.

► Enhanced shine is thus one of the most recognisable sensory effects which consumers seek from hair care products.

► 4622 new SKU’s launched over the past year promoting hair shine or hair gloss*

► 1217 new SKU’s launched over the past year promoting shine or gloss in skin care products*

► There is an ongoing search by formulators for “more shine”!

* From Mintel GNPD database
Creating Shine in personal care products

► Key ways to improve shine in hair:
  • Reflection of light – increase the alignment of hair fibers
  • Complete wetting of entire surface
  • High refractive index coating

► Commonly found products in hair shine serums, sprays (and lipstick, etc):
  • Phenyl Trimethicone
  • Caprylic/Capric Triglyceride
  • C12-15 Alkyl Benzoate
Shineblend® MAX by Innospec


► Developed using a special grade of C12-15 Alkyl Benzoate to significantly increase shine.

► Physical Properties:

- Color / Appearance: Clear Colorless Liquid
- Odor: Mild Odor
- Appearance: Clear
- Refractive Index: 1.49
- Viscosity: 10 – 14 cP
- Specific Gravity: 0.910 – 1.010

► Specially formulated shine-enhancing additive for all applications were high shine is desired.

► Patent Pending.
Hair Shine Test Protocol

Objective
► To test permutations of blends of high refractive index silicones with various high refractive index benzoate-ester emollients as hair serums (leave-on treatments) and sprays for their ability to increase the shine of hair compared to the appropriate controls.

Procedure
► Bleached hair tresses, 6 inches in length weighing approximately 2 grams each, were used to demonstrate gloss improvement.
► Tresses were pre-washed with 10% SLES-2, blow dried and combed.
► Images of untreated and treated tresses were taken using a digital camera. Approximately 0.15 ml of each of the blends was applied to individual hair tresses.
► Application details:
  **Serum:**
  - Dispense 0.15 ml of hair serum into palm of hand.
  - Rub hands together and then rub the serum from the hands onto the dry hair swatch and distribute evenly throughout the hair.
  **Pump spray:**
  - Three pumps per swatch (total 0.30 ml)
Photography and Image Analysis

- Digital images were taken of untreated and treated tresses using a Kodak Z740, 5.0 megapixels, with 10x optical zoom.

- Untreated and treated tresses were placed side by side on a plain white background. An image was obtained of both tresses under identical lighting conditions and distance from the camera.

- Image files were imported into Image Pro Plus 7.0 for analysis of shine.

- All color photos were converted to gray scale and total area of bright pixels, representing shine on a dark background, was calculated.

- Data was imported into MS Excel and shine improvement in percent and times were calculated for each sample tested.
Image Analysis

- Pictures transformed to grey scale
- Using this technique, data in square millimeters of bright pixels is generated and used to calculate the percent shine improvement of treated tresses versus untreated tresses.
Shine Improvement Results

% Shine Improvement

Treatment

- Phenyl Trimethicone
- Diphenyl Dimethicone
- Diphenylsiloxy Phenyl Trimethicone
- Finsolve TN
- Special Grade C12-15 Alkyl Benzoate
- Shinebend MAX
- Diphenylsiloxy Phenyl Trimethicone AND Finsolv TN
- Diphenyl Dimethicone AND Finsolv TN
Phenyl Trimethicone | Shineblend® Max

Treated | Untreated | Treated | Untreated
Comments on the results

- The magnitude of the effect obtained was not expected! The refractive index of Shineblend® Max is 1.490 compared to that of Diphenylsiloxy Phenyl Trimethicone (1.498) – so the mechanism is not due to a synergistic RI increase.

- We believe the invention is profound and will provide formulators with a means of delivering step-change enhancement in hair shine.
Anhydrous Serum Prototype I

Anyhydrous Shine Serum Prototypes
Percent Improvement

Shine Serum

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>% Shine Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cosmetic Fluid 9109-OH</td>
<td>400</td>
</tr>
<tr>
<td>CF 9109-OH + 5% Diphenyl Phenyl</td>
<td>600</td>
</tr>
<tr>
<td>Trimethicone</td>
<td></td>
</tr>
<tr>
<td>CF 9109-OH + 2.5% Diphenyl Phenyl</td>
<td></td>
</tr>
<tr>
<td>Trimethicone and 2.5% Finsolv® TN</td>
<td></td>
</tr>
<tr>
<td>CF 9109-OH + 5% Shineblend® Max</td>
<td>1200</td>
</tr>
</tbody>
</table>
Anhydrous Serum Prototype II

Anhydrous Shine Serum Prototype Percent Improvement

Shine Serum

Gelaid® CPDP

Gelaid +

Gelaid® CPDP + 5% Shineblend® Max

2.5% Diphenyl Phenyl Trimethicone and 2.5% C12-15 Alkyl Benzoate
Anhydrous Pump Shine Spray Prototype

Shine Pump Spray Prototypes
Percent Shine Improvement

% Shine Improvement

Shine Spray

Shineblend® Max
(Control)

Shineblend® 6005

Shineblend® 6005 +
0.25% Phenyl
Trimethicone

Shineblend® 6005 +
0.25% Shineblend® Max
Commercial Shine Spray
Shine Improvement using Shineblend® MAX

Commercial Shine Sprays Dosed with Shine Blend Max

% Shine Improvement

<table>
<thead>
<tr>
<th>Treatment</th>
<th>% Shine Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial A</td>
<td>60</td>
</tr>
<tr>
<td>Commercial A 10% SBX</td>
<td>45</td>
</tr>
<tr>
<td>Commercial B</td>
<td>20</td>
</tr>
<tr>
<td>Commercial B 10% SBX</td>
<td>15</td>
</tr>
<tr>
<td>Commercial B 20% SBX</td>
<td>10</td>
</tr>
<tr>
<td>Commercial C</td>
<td>50</td>
</tr>
<tr>
<td>Commercial C 5% SBX</td>
<td>35</td>
</tr>
<tr>
<td>Commercial C 10% SBX</td>
<td>25</td>
</tr>
</tbody>
</table>

SBX = Shineblend® Max

Commercial A: Cyclopentasiloxane, Dimethiconol, Ethylhexyl methoxycinnamate, Mineral oil, Hydrolyzed silk, Fragrance
Commercial B: Alcohol, Cyclopentasiloxane, Cyclohexasiloxane, C12-C15 Alkyl benzoate, Fragrance
Commercial C: Alcohol, Cyclopentasiloxane, Isopropyl myristate, C12-C15 Alkyl benzoate, Fragrance
## Smooth, Style and Shine Hair Gel-Serum - ref. H0084

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount in Formulation / % w/w</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>qs to 100</td>
</tr>
<tr>
<td><strong>Gelaid® CPE</strong></td>
<td></td>
</tr>
<tr>
<td>(Cyclopentasiloxane (and) Dimethicone/Vinyl Dimethicone Crosspolymer (and) Hydroxyethyl Acrylate/Sodium Acryloyl Dimethyl Taurate Copolymer)</td>
<td>15.4</td>
</tr>
<tr>
<td><strong>Shineblend® Max</strong></td>
<td></td>
</tr>
<tr>
<td>(Diphenylsiloxy Phenyl Trimethicone (and) C12-15 Alkyl Benzoate)</td>
<td>3.0</td>
</tr>
<tr>
<td>Euxyl® PE9010</td>
<td>1.0</td>
</tr>
<tr>
<td>(Phenoxyethanol (and) Ethylhexylglycerin)</td>
<td></td>
</tr>
<tr>
<td>NaOH 5% w/w</td>
<td>q.s. to pH 5.0 – 6.5</td>
</tr>
<tr>
<td>Glycerin</td>
<td>47.6</td>
</tr>
</tbody>
</table>

Applied to dry hair and blow dried and styled as a finishing treatment
Shineblend® Max Provides Long Lasting Shine

- 75% of the shine provided by Shineblend® Max remains after 24 hours
Formulation Suggestions to Maximise Shine

- Formulations should have a high refractive index, spread well on hair and form a uniform film coating the hair shaft.

- If using a volatile carrier determine if the claim ingredients and fragrances are compatible with shine producing blend that is delivered to the hair. Incompatibility with the shine blend can adversely affect shine.

- Silicones spread easily! In order to achieve long lasting shine, shine formulations should produce a uniform “stay-in-place” film as much as possible. Use high viscosity silicone gum blends or resins to increase the viscosity of resulting films.
Conclusion

- Shineblend® Max increases shine levels when used either neat, as supplied, or in formulated prototypes such as anhydrous serums, shine pump sprays, etc at a level as low as 0.25 wt%.
Summary

- **Shineblend® Max** was created as an improvement over high refractive index silicones. Initial applications to focus on are anhydrous hair shine serums and sprays. Other applications where high refractive index silicones are currently used should be targeted.

- **Shineblend® Max** is proven to significantly increase shine on hair as part of an anhydrous silicone serum.

- **Shineblend® Max** provides long lasting shine.

- The mechanism of increased shine is not based on refractive index alone.
Thank you for listening.

Any questions?

tony.gough@innospecinc.com