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Upcoming Events

December Holiday Social
15th December 2016
Location - TBD

FLSCC CEP COURSE Rescheduled
24th, January 2017
Coral Springs Marriott
11775 Heron Bay Blvd, Coral Springs, Fl

February Meeting
23rd, February 2017
Orlando, Fl

FLSCC Sunscreen Symposium
14th - 16th, September 2017
Disney’s Yacht and Beach Club
Lake Buena Vista, Fl

FLSCC Membership
If you have not renewed your membership please visit www.scconline.org and register. Renewals are due by 30 December 2015 for 2016. We want you to continue to be an active part of FLSCC.
Announcements

2017 Sunscreen Symposium
Florida Chapter Society of Cosmetic Chemists

Global Innovation and Sustainability for the Future of Sunscreens
September 14th—16th, 2017

Call for Papers
Authors are invited to submit titles and abstracts of no more than 150 words for papers to be presented in podium format.

Submission Deadline: January 31st, 2017
All topics related to Cosmetic Science will be considered for presentation.
Submit abstracts to FLSCCSUN@gmail.com
Please include a photo and biography.

Time Table for Submissions:
- January 31st, 2017—Deadline for abstract submissions.—Include photo and biography
- March 1st, 2017—Presenters/Author notified
- May 1st, 2017 Presentation agenda finalized
- June 1st, 2017—Preprints, Author bios & abstract (min 200 word, max 2 pages including figures)
- August 1st, 2017—Final presentation received by FLSCC Chapter
- September 15th & 16th, 2017—Sunscreen Symposium Podium Presentation

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2017 Sunscreen Symposium
Florida Chapter Society of Cosmetic Chemists

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https://www.facebook.com/SCCFloridachapter
Silicones Protect Hair from Heat Styling Devices

Now consumers can turn up the heat... and turn down the damage

Sylvain Massé
Sabrina Marchioretto
Charlène Fournier

In a hair care market replete with high tech products, there’s still room for those that help consumers achieve faster and better hair styling without hair damage. The use of heat for drying and styling certainly isn’t new, but heating plates, hair dryers, curling irons and other styling appliances are now designed to operate at higher temperatures than previously – sometimes up to 230°C (446°F). The result can be hair that is dry, dull and harder to comb, with brittleness that may lead to broken hair. The objective for consumers who favor heat styling is to be aware of the potential damage associated with its misuse, and to enhance their treatments with products that can help protect hair. Recent research on specialty silicones has led to several specific materials that do just that. This article considers the latest developments in heat protection for hair from a consumer perspective.

There’s no typical consumer

How do consumers approach heat styling? In many cases, they don’t specifically look for heat protection, but rather efficient styling with a minimum – or ideally no – damage. Where specialty silicone materials are concerned, it’s not only possible to document heat protection, but also demonstrate that silicones can help deliver styling that’s better for hair health, while also faster and longer lasting. A recent study1 assigned consumers to one of three distinct categories: those who are uninformed about heat styling, those who are informed but willing to take a risk, and those who are informed and unwilling to take a risk.

In the first category, consumers were either uninformed about effects associated with the use of heat styling, or informed but neutral to the potential associated with heat damage. A general profile of these consumers suggests their primary objective is styling; they may not be concerned about hair health. In addition, they may be younger consumers, either uninformed or informed, yet lacking in caution by not bothering to use a heat protectant. In general, they depend solely on heat appliances to straighten or style their hair, and they use heat more frequently than recommended. Furthermore, if they do apply a product designed to protect hair from heat, they often apply it incorrectly – that is, by using too little or too much. Consumers in this category may move to broken hair. The objective for consumers who favor heat styling is to be aware of the potential damage associated with its misuse, and to enhance their treatments with products that can help protect hair. Recent research on specialty silicones has led to several specific materials that do just that. This article considers the latest developments in heat protection for hair from a consumer perspective.

In the second category, consumers are informed about effects that result from heat damage, and they take precautions to reduce its likelihood. These consumers typically use thermal styling tools at lower temperatures and with less frequency than those in the first group. To protect hair health, they may also forego heat styling for a period of time or use advice from tutorials shared by consumers on social media to achieve straightened hair. While these methods may be essentially valid, they typically are not based on a foundation of experimental precision. In general, consumers in this group have a high regard for hair health but also are willing to take heat styling risks to achieve the perfect hair look. As in the first category, they may eventually migrate to the next consumer profile if they experience heat damage.

The final category represents consumers who have chosen to avoid all forms of heat styling due to previous experience with hair damage. Based on this objective of avoiding further risk, they rely on styling methods that do not depend on heat. In short, hair health is the overriding goal, even though the styling result isn’t as high in quality or as defined as what can be achieved by using a heat styling device.

Helping consumers protect their hair

Based on research from Dow Corning, there’s good news for consumers in all three groups. Specific specialty silicones can reconcile the three profiles, meaning there’s no longer a need to compromise between hair styling and hair health. Still, there is plenty of growth opportunity in the hair care market for broader focus and awareness on protection from heat associated with hair styling (Figure 1, next page). Heat protection claims are most popular in styling products and leave-in conditioners, with lower penetration of claims in shampoos and rinse-off conditioners. These consumers typically use thermal styling tools at lower temperatures and with less frequency than those in the first group. To protect hair health, they may also forego heat styling for a period of time or use advice from tutorials shared by consumers on social media to achieve straightened hair. While these methods may be essentially valid, they typically are not based on a foundation of experimental precision. In general, consumers in this group have a high regard for hair health but also are willing to take heat styling risks to achieve the perfect hair look. As in the first category, they may eventually migrate to the next consumer profile if they experience heat damage.
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**Helping consumers protect their hair**

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Dow Corning has assessed the heat resistance of hair with Caucasian slightly bleached and Latino curly virgin hair, using a procedure designed to replicate consumer habits and styling methods.

Sample hair tresses were treated with diluted materials at 3% active, allowed to dry in a 70°C oven to mimic the consumer step of blow drying, then exposed to an oven cycle from 130°C up to 230°C. Potential protection benefits were assessed by quantifying the broken hair, after wetting and brushing the heat-damaged tresses. The level of protection was expressed by calculating the percent reduction in quantity of broken hair versus untreated tresses.

This study evaluated a range of silicones from various silicone families, as well as several organic materials used to claim heat protection. Table 1 summarizes the silicones that demonstrate optimum protection with easy, faster, and longer-lasting styling. One key to healthy hair is a smooth hair cuticle. Excessive heat can cause the cuticle to crack and erode, one of the first steps toward breakage. In the case of hair treated with glycerin, test results showed more broken hair than from tresses with no treatment. Figure 2 shows that specific silicones can help preserve cuticle integrity.

Silicones that offer heat protection also help restore the natural hydrophobicity of hair. Figure 4 shows hydrophilic/hydrophobic characteristics of heat-damaged hair. The untreated tress (left) and a tress pre-treated with glycerin (center) show hydrophilic characteristics of damaged hair, a water droplet instantly spreads on the damaged fibers. However, the tress pre-treated with a 3% active dilution of Dow Corning 969 Emulsion (right) caused water to bead on the hair surface, demonstrating that the silicone restored the natural hydrophobicity of the hair.

**Multifunctional benefits**

From the consumer perspective, the addition of Dow Corning CE-8411 Smooth Plus Emulsion, Dow Corning 969 Emulsion, or Dow Corning AP-8087 Fluid helps facilitate straightening.

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Table 1. Dow Corning® and XIAMETER® brand silicones evaluated for heat protection

<table>
<thead>
<tr>
<th>Product</th>
<th>INCI Name</th>
<th>% Silicone Active in the Product</th>
<th>Reduction in Breakage (Based on 3% Active)</th>
<th>Suggested Product Forms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dow Corning® 961 Emulsion</td>
<td>Amodimethicone (and) Carboxinum bistrine (and) Tridec-101 (and) Tridec-015</td>
<td>&lt;30%</td>
<td>85%</td>
<td>Water-based creams and sprays</td>
</tr>
<tr>
<td>Dow Corning® CE-8411 Smooth Plus Emulsion</td>
<td>Bis-Cyclopentamido-PG-propyl Dimethicone / Bis-Indolyl PEG-14 Copolymer (and) Polypropylene 20 (and) Butylpoxanol</td>
<td>&lt;50%</td>
<td>80%</td>
<td>Water-based creams and sprays</td>
</tr>
<tr>
<td>Dow Corning® AP-8087 Fluid</td>
<td>Bis-Hydroxy / Methoxy Amidimethicone</td>
<td>100%</td>
<td>71%</td>
<td>Amorphous gels or ointment</td>
</tr>
<tr>
<td>XIAMETER® PMA-1502 Fluid</td>
<td>Cylopentyldecane (and) Dimethicone</td>
<td>15%</td>
<td>–</td>
<td>Amorphous gels or ointment</td>
</tr>
<tr>
<td>XIAMETER® PMA-1502 Fluid</td>
<td>C12-13 Isopropyl (and) Dimethicone (and) Undecylcarbox (and) Dimethicone</td>
<td>15%</td>
<td>33%</td>
<td>Amorphous gels or ointment</td>
</tr>
<tr>
<td>XIAMETER® PMA-1502 Fluid</td>
<td>Dimethicone (and) Dimethicone</td>
<td>15%</td>
<td>–</td>
<td>Amorphous gels or ointment</td>
</tr>
</tbody>
</table>

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As an example of the test approach with Caucasian slightly bleached tresses, Figure 2 illustrates how hair treated with a commercial benchmark silicone product based on amidimethicone and dimethicone resulted in an 82% reduction in hair breakage versus untreated, heat-damaged hair.
Figure 5. Caucasian fuzzy tresses treated with 3% active Dow Corning AP-8087 Fluid or Dow Corning 909 Emulsion show better alignment of hair fibers compared to untreated tresses.

Figure 6. Hard-to-manage hair responds to treatment with the specialty silicones, requiring up to 50% fewer passes of a straightening iron.

Figure 7. Specialty silicones evaluated in this study demonstrate longer-lasting straightening effects, up to at least 24 hours, while also controlling frizz.
eliminate flyaway hair, maintain hair suppleness, and improve hair alignment after blow drying. It’s possible to reduce the number of iron passes needed to straighten the hair, while achieving long-lasting style and frizz control for at least 24 hours, particularly with the Dow Corning CE-8411 Smooth Plus Emulsion and Dow Corning 969 Emulsion.

In this work, we also demonstrated that while a reduction in flyaway hair initially led to better hair fiber alignment, its ultimate benefit was reduced hair damage caused by excessive heat. In fact, fibers in close proximity collectively protect surrounding fibers by more homogeneously dissipating heat carried by hot air. The permeability of silicone to water vapor is another factor in heat protection, as is the ability of amino silicone to preferentially deposit on damaged areas of hair, such as cracks and cuticle edges, while remaining stable up to 230°C. Figure 5 illustrates two of the materials and their benefits related to hair alignment. A 3% active dilution was applied to Caucasian frizzy hair, which is recognized for its poor manageability, followed by a drying step in a 70°C oven to mimic air-dryer conditions. From the consumer perspective, the result is easier combing, with a reduction of frizz, leading to better manageability and facilitated styling.

To demonstrate that styling could be facilitated, a new test method was developed. Based on use of a straightening iron, a series of 24 panelists concluded that compared to untreated hair, hair treated with these silicones can be straightened with up to 50% fewer passes (Figure 6). Additionally, this study demonstrated that Dow Corning AP-8087 Fluid, Dow Corning CE-8411 Smooth Plus Emulsion, or Dow Corning 969 Emulsion allowed straightened hair to maintain its shape for at least 24 hours, while also controlling frizz (Figure 7).

Formulating for protection from heat styling

Tables 2 and 3 illustrate formulations based on some of the suggested product forms mentioned in Table 1. Table 2 illustrates a water-based, leave-in conditioner cream containing 3% silicone active (5.36% Dow Corning CE-8411 Smooth Plus Emulsion). Table 3 shows a protective dry oil based on an anhydrous formulation that contains 3% Dow Corning AP-8087 Fluid, as well as 2.5% dimethiconol from XIAMETER PMX-1502 Fluid.

This spritz is designed to be sprayed on the palm, and after rubbing the hands together, applied to hair using the fingers as a comb to rake the product through damp hair. The hair is then massaged and combed, so its entire surface is evenly protected. These formulations defend against heat damage up to 230°C. They preserve the resistance of hair to breakage and help maintain cuticle integrity, while restoring the hair’s healthy, hydrophobic state.

The two silicones eradicate flyaway hair and preserve their typical suppleness of hair that is not heat damaged. Hair alignment is improved after blow drying, facilitating straightening, and bringing long-lasting style with frizz control for at least 24 hours.
Summary and conclusions

In summary, silicones evaluated in these studies fulfill consumer needs in terms of heat protection for hair styled with heat appliances. They can also facilitate styling by reducing the number of heat passes required, and by enabling longer-lasting style. Used as heat protectants, specialty silicones can provide:

- Heat protection up to 230°C (446°F) with up to 98% reduction in hair breakage
- Cuticle preservation
- Restoration of hair’s healthy, hydrophobic state
- Maintenance of hair suppleness
- Improved hair alignment after blow drying
- Facilitated heat styling with up to 50% reduction in number of straightening iron passes
- Long-lasting style and shape, up to 24 hours, while controlling frizz

To prevent hair damage and breakage, effective heat protection – proven to withstand the highest temperatures of thermal styling tools – is critical. Specific silicone materials such as Dow Corning AP-8087 Fluid, Dow Corning CE-8411 Smooth Plus Emulsion, and Dow Corning 969 Emulsion provide protection from heat styling tools, while also offering ease of styling and long-lasting shape. Today’s hair care market holds potential for a range of product forms that can protect hair from the high temperatures of heat styling. With an understanding of how consumers perceive the desired develop products that not only enhance hair health but also facilitate styling and have a longer-lasting effect. In addition, they can benefit from Dow Corning’s results and formulation suggestions, making ingredient selection easy, thanks to the identification of top performing solutions and tailored recommendations according to product form (from spray to cream texture, in anhydrous or water-based systems).

For consumers, the news is good: the specialty silicones described in this study can shield hair from the damaging effects of thermal styling, so there is no need to compromise between exceptional style and healthy-looking hair.

*Dow Corning Products are distributed by Univar*
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