A Bright Future for Sun Care:

The value of photostabilization in sun care and daily wear products

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As awareness grows about the detrimental effects of unprotected UV exposure, consumers and regulators seek better performance from personal care products. For the market to truly reach its potential, more effective science needs to find its way into manufactured products and consumers' hands.

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The Revolution in Sun Care

Rent a copy of any 1960s beach party film

and you'll undoubtedly find a scene with a lifeguard sitting on top of a wooden tower, keeping a watchful eye on the clambake. It's likely that the lifeguard has slathered his nose with a large white splotch of sun block to make sure he doesn't burn from hours of sitting in the sun.

That's because until relatively recently, skin care products designed to protect from the sun were made primarily from minerals that lay on top of the skin, such as titanium dioxide or zinc oxide, which left a visible white coverage area. While aesthetically unpleasant, these mineral sunscreens were moderately effective at blocking two critical types of rays from the sun—Ultraviolet-A and Ultraviolet-B—that can cause burning, aging, and even cancer.

A wide range of factors are coming together to remake the global sun care market.

Today, however, consumers have moved past bulky mineral sun blocks to demand a more sophisticated and aesthetically pleasing palette of sun care products. In fact, a wide range of factors—including worldwide regulatory changes, increased consumer awareness, changing global demographics, and exciting advances in sun care science and technologies—have come together to remake the global sun care market. Most important is the continued demand for better and more effective sun care products, particularly those that protect against UVA rays, which are increasingly linked to premature skin aging and risk of skin cancer.

Companies positioned to contribute to the trend for increased sun care effectiveness—through cosmetic appeal or more effective formulation of photostabilizers, such as those developed by HallStar—have the opportunity to expand market share, increase top-line growth, and strategically position their products within an ever-more-competitive landscape. As consumers increasingly demand photostable sun protection in other product lines, such as daily wear moisturizers and color cosmetics, the opportunities are likely to expand even further.

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Already a Sunny Day

No matter how you slice it, the sun care channel is booming. In 2008, U.S. sales of sun care lotions and oils rose six percent from the year before, to $601.1 million, according to Information Resources, Inc. Worldwide sales were estimated at $4.4 billion in 2005, up seven percent from the year before, as tracked by Euromonitor International.

Critical factors that drive the boom include increased regulation, changing demographics, and consumer demand. In 2006, the European Commission regulatory body recommended new minimum performance standards for sun protection products and restrictions on their marketing claims. Key among those is that a sunscreen's UVA protection, as determined by a clinical study, should be no less than one-third of the product's labeled SPF. Similar moves are in place or being considered in other areas of the world, including Japan, Brazil, and Australia.

Increased consumer awareness of the potential dangers of both UVA and UVB rays contribute to the greater demand for effective sun care products.

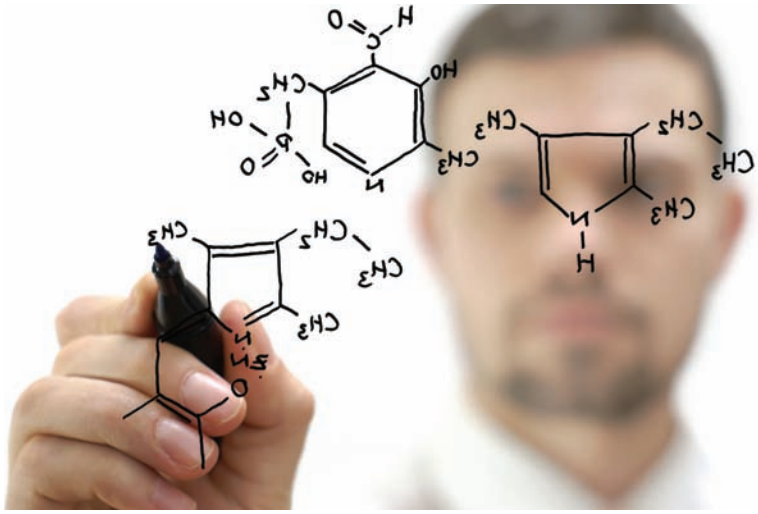
In the U.S., sunscreens are regulated as over-the-counter drugs by the Food and Drug Administration. In 2007, the FDA proposed rules for formulating, testing, and labeling, as well as a uniform standard for measuring and communicating the UVA protection provided by sunscreens. The proposed new standard combines clinical and laboratory tests to determine the category of UVA protection—low, medium, high, or highest. Results would be demonstrated on product labels by a rating of one to four stars.

As millions of baby boomers move into middle age and beyond, both awareness of and demand for sun care products that can help slow the premature-aging effects of the sun should continue to rise.

Better Protection Through Photochemistry

A critical force shaping the future of sunscreen products is increased photostability—the science behind the benefits.

Most sunscreens are formulated to work in one of two ways—they either contain organic chemicals that absorb UV rays before they reach your skin, or they contain metal oxides to protect the skin by reflecting or scattering UV rays. Some products combine organic UV filters and metal oxides, though the vast majority of products in the U.S. contain organic UV filters exclusively.



In recent years, interest in sunscreen photostability has grown with the use of the UVA filter Avobenzone. Spurred by demand for greater protection against UVA radiation, Avobenzone, a dibenzoylmethane-derived, oil-soluble ingredient designed to absorb the full spectrum of UVA rays, has become the most widely used UVA filter in the world. However, under certain conditions Avobenzone is photolabile, meaning that its ability to absorb UV radiation starts to decline soon after it is exposed to sunlight.

Better photostabilizing ingredients are needed to help maintain the integrity of the UVA filters used in sunscreen formulations. Photostabilizers in common use today include Octocrylene, Methyl benzylidene camphor, and HallStar's own Polycrylene,® HallBrite® BHB, and Spectrasolv® DMDA.

For product manufacturers looking for ways to make their products better, HallStar photostabilizers provide sunscreen manufacturers with new and exciting opportunities.

Strategies for Photostabilization

Photostabilizers employ one of two different techniques to improve sunscreen performance. The first, utilized by HallStar's Polycrylene,® is based on photochemistry theory. Organic UV filters convert the energy in solar UV radiation to electronic excitation energy, then dissipate that energy though heat. Commonly, they follow a well-defined cycle: absorption; excitation to the short-lived singlet excited state; decay to the longer-lived triplet excited state; then return to the original or ground state.

As consumers become more educated about UV light-induced damage to skin, companies that help develop higher performance products are uniquely positioned.

During the triplet excited state, organic UV filters are vulnerable to destructive chemical reactions. Polycrylene and most other photostabilizers in use today help organic UV filters, especially Avobenzone, dissipate their energy more quickly during this state to avoid these reactions.

HallBrite® BHB and Spectrasolv® DMDA employ the notion that exposure to sunlight causes electrons in organic UV filters to start moving and possibly transfer from one molecule to another. This electron transfer theory says, in part, that the polarity of the sunscreen can affect the rate of electron transfer. Both HallBrite BHB and Spectrasolv DMDA are polar compounds that have been found to improve photostability in sunscreens.

How effectively do photostabilizing ingredients improve sunscreen performance? In the case of HallStar products, the answer is: Extremely well. By utilizing photochemistry and electron transfer theory-based technologies developed in HallStar's laboratories, these products help formulators meet or exceed most international UVA performance guidelines while enhancing the aesthetics of the finished product. As a result, use of Polycrylene, HallBrite BHB, and Spectrasolv DMDA is growing rapidly.

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A Thirst to be Quenched

HallStar has recently unveiled SolaStay™ S_1, a new technology that will change the way sunscreens are formulated and dramatically improve the way they perform.

When Avobenzone and Octinoxate (Octyl methoxycinnamate, or OMC, a widely used sunscreen ingredient) are combined in a sunscreen, exposure to UV radiation causes them to chemically react and destroys their ability to absorb UV radiation. Less absorbance for the sunscreen results in less protection for the consumer.

Many photostabilizers commonly used today are called "triplet quenchers" because they absorb energy from UV filter molecules that are in the triplet excited state, allowing them to return to the ground state more quickly. It's a very fast process, but not fast enough to stop all the chemical reactions that break down UV filters. The reaction of Avobenzone and OMC, for one example, is just too fast for triplet energy transfer to work effectively.

SolaStay™ S_1 outperforms Octocrylene and other photostabilizers.

SolaStay™ S_1 has solved this problem by quenching UV filters such as Avobenzone before they can reach the triplet excited state. This unusual ability to quench singlet excited state energy makes SolaStay™ S_1 much more powerful than Octocrylene and other photostabilizers in widespread use.

Very simply, SolaStay™ S_1 is the most powerful sunscreen photostabilizer available today. It offers formulators previously unobtainable levels of protection against both the burning and aging rays of the sun while allowing for reduced UV-absorbing ingredient levels and improved aesthetics. In short, manufacturers now have a wealth of formulating options to enhance sunscreen performance.

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Consumers Drive Change

Product manufacturers are always looking for ways to make their products better, and HallStar photostabilizers such as SolaStay™ S_1 provide sunscreen manufacturers with new and exciting opportunities. But more important is how this science responds to the challenges of today's sunscreen—and, by extension, the daily wear product categories. In addition to regulatory regimes, changing demographics and increased consumer awareness are altering the landscape for a wide range of personal care products.

The need for effective photostabilizers is made all the more acute as the pool of potential consumers expands from sunscreen to daily wear products.

As consumers demand products that protect against both UVA and UVB rays, manufacturers must deliver products that can perform as advertised, at reasonable costs, with aesthetic and cosmetic appeal.

The need for effective photostabilizers is made all the more acute as the pool of potential consumers expands from active wear sunscreens to daily wear products, such as facial moisturizers and tinted foundations, as consumers seek better protection against the aging effects of the sun. Indeed, the major multinational cosmetic companies are already stressing UV protection in their marketing campaigns. As a result, daily wear products such as cosmetics, hair, and skin care increasingly boast SPF 15 or SPF 30 protection levels with broad spectrum UV protection. Effective photostabilizers boost the performance of these products.

From a daily wear product manufacturer's standpoint, leveraging the additional benefits offered by effective sunscreen properties is likely to prove a valuable—and profitable—proposition. From manufacturing to packaging to advertising, the cost of adding sunscreen actives and photostabilizers to color cosmetics is minimal compared to the product differentiation that can be achieved.

Heading Into the Sun

For companies strategically positioned to

profit from this change in the sunscreen and personal care markets, the future looks bright. But challenges remain. In the face of generalized global economic conditions, changing regulatory schemes, evolving consumer preference, and increasing competition, personal care companies must drive themselves to execute strategy, push scientific boundaries, and continually improve performance.

Today, consumers have moved past bulky mineral sun blocks to demand a more sophisticated and aesthetically pleasing palette of sun care products.

The opportunity exists to increase both top- and bottom-line profitability by leveraging unique, patent-protected products such as Polycrylene,® HallBrite® BHB, Spectrasolv® DMDA, and SolaStay™ S_1. Increased consumer awareness of the need for better protection against UV light-induced damage to the skin suggests the market will continue to grow. Companies like HallStar that can provide the scientific and technical expertise to develop higher-performance products are uniquely positioned to help it reach its full potential.

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