SCC 79TH ANNUAL SCIENTIFIC MEETING & SHOWCASE

DECEMBER 16-17, 2025 | SHERATON NY TIMES SQUARE, NEW YORK

Speaker Abstracts

Session H: Advancing Photoprotection

Beyond Ingredients: Unlocking SPF Performance Through Processing and Spreadability

Yung Chan; Applechem, a Solabia Group Company

Mineral sunscreens are in high demand for their safety, natural origin, and broad-spectrum protection. Despite their desirable light feel, oil-in-water (O/W) sunscreens struggle to provide reliable SPF. Their structural integrity often relies on lamellar networks, which are typically thought to require minimal shear during processing. Yet, even with identical active content, SPF outcomes can vary significantly.

This study explores how processing, specifically shear intensity during cooling, impacts the performance of a 100% natural ZnO-based O/W sunscreen. Using the same ingredients, we found significant differences in SPF, spreadability, and stability based solely on processing.

This shifts the focus from just active ingredients to a process-focused approach. Higher shear during cooling remarkably enhances ZnO performance and spreadability, leading to optimized SPF efficacy. This new understanding improves reproducibility, reduces SPF failure risk, and supports mineral sunscreen innovation aligned with both consumer and regulatory expectations.

Beyond Synthetic Polymers: Revolutionary Seaweed Cellulose Technology Transforms Clean-Label Formulations

Allen Donaldson, Vice President of Beauty at Macro Oceans

This presentation reveals a groundbreaking solution to one of cosmetic formulation's most persistent challenges: creating high-performance and beautifully textured formulations with natural, functional polymers.

Through innovative sustainable processing of seaweed cellulose fibers, Macro Oceans has developed a 100% natural super absorbent polymer that matches synthetic carbomer performance on water absorption, suspension, dispersion, texture, and reactive shear thinning/stress.

Unlike conventional natural hydrocolloids, this breakthrough enables: sprayable formulas with high-concentration mineral UV filters without settling or nozzle clogging; suspension and dispersion of color cosmetic pigments in low viscosity systems; faster line manufacturing and light and fresh skin feel of wipe products.

Beyond technical performance, these functional seaweed fibers deliver the silky, smooth skin feel previously exclusive to synthetic polymers, while offering a compelling sustainability story free from microplastics.

Attendees will learn how seaweed-derived cellulose opens new possibilities for formulators to build truly innovative products that wow consumers.

In Vitro Solar Tests: Advances and Perspectives by Evaluating the Absorption of Heterogeneous Sunscreen Films

Presenter: Frederic Nunzi; SGS IDEA Lab

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A solar product must protect against both UVB and UVA radiation, with protection levels quantified by SPF and UVA-PF. Traditionally, these are measured *in vivo* via respectively the ISO 24444 and ISO 24442 standards. The UVA-PF can also be measured *in vitro* via the ISO 24443 method. Due to ethical and cost concerns, *in vitro* testing is gaining popularity. A new standard, ISO 23675, introduces an *in vitro* "double plate method" for SPF measurement. This study examines its limitations, particularly the heterogeneity of sunscreen films on PMMA plates, which leads to discrepancies with *in vivo* results—especially in high-SPF products. Researchers used UV photography, contact angle measurements, UV spectrometry, optical profilometry, and modeling to explore the link between film uniformity, absorbance, and SPF. They developed a validated model relating absorbance, film thickness, and homogeneity through linear attenuation coefficients. These findings enhance understanding of *in vitro* test variability and support the development of more reliable and reproducible sunscreen evaluation methods.

Enabling Rapid Prototyping Through AI Assisted Measurement of Sunscreen Efficacy Based on Diffuse Reflectance Spectroscopy

James Price; Zinco Verde, Inc.

The recent release of the new ISO 23698:2024 – "Standard Test Method for in-vitro Diffuse Reflectance Spectroscopy" established the first formal protocol for non-invasive DRS-based sun protection factor (SPF) estimation. This new standard has opened the door for in-vitro (non-invasive) testing of sunscreen efficacy that accurately estimates in-vivo (invasive human testing) for SPF performance. Although DRS has long been used in research settings, ISO standardization combined with Artificial Intelligence-driven modeling marks a paradigm shift in rapid prototype evaluation. Zinco Verde's AI-enabled software platform integrates DRS measurements, formulation composition data, and curated ingredient datasets, giving formulators real-time, context-aware analytics that accurately predict in-vivo SPF performance for rapid formulation prototyping.