Sink Or Swim

2021

Abstracts Program

Keynote Speaker

Product Development for Today and the FutureJohn Gilbert, Behr Process Corporation

What are some of the key enablers for doing product development in today's environment? How have these changed post Covid-19? This presentation will review four key areas: people, place, process and pandemic. The effect of company culture on product development will also be discussed. A successful development program requires that each of these areas receive some attention from your company's management team. John will highlight some learnings from having spent over 30 years in product development and formulation, as well as adjustments that are happening post pandemic.

Plenary Speaker

Why We Paint: Yesterday,Today, & Into the Future
Terri Ziegler, The Sherwin Williams Co.

Paint and coatings have had an important role throughout history in beautifying and protecting the world around us. What and how we paint continues to evolve with the reasons why we paint grounded in common yet progressing themes. Exploring the what, how, and why we paint of yesterday and today can guide the next wave of opportunities and scientific advancement in the future of paint and coatings.

New Defoaming surfactants
Smriti Arora, BYK USA, Inc.

Aqueous coatings present a particular challenge regarding formulation since they require the use of additives that exhibit strong properties, yet also should not have any negative effects on the foam stabilization. In applications such as the coating of non-polar plastic substrates or contaminated metal surfaces, excellent substrate wetting and perfect leveling are not easy to achieve at the same time. A significant reduction in surface tension is necessary to obtain the required level of substrate wetting. The desired performance is often only achieved by using multiple types of additives. To be able to offer products that are simple and perfectly suited to users' requirements, BYK has now developed new defoaming surfactant technology that combines the necessary properties in an ideal manner.

High Performance Polycarbamides/Polyaspartics Enables Fast Return to Service
Shiying Zheng and Shafiq Fazel, Evonik, Corporation

The Coatings Industry is constantly facing the challenge of meeting and addressing more and more stringent emissions requirements, all while improving productivity and maintaining high performance. Although there are many technologies for coatings applications, the choices become more limited when fast cure speed is a critical attribute coupled with high durability, good aesthetics and excellent barrier properties. This paper will highlight Evonik's polycarbamide/polyaspartic technology, which features fast cure speed, excellent UV stability, low emissions, high chemical and abrasion resistance and excellent barrier properties on different substrates. In addition, the technology offers formulators the unique ability to custom the sheen of the coatings. Polycarbamide/polyaspartic coatings can be applied itself or in combination with Epoxy technologies. We will provide an example of the synergy of these two technologies for one-day flooring system that enables the applicators to install floor coatings with strong physical and mechanical properties, rapid property development and improved adhesion to damp and

New Additive to Eliminate Pinholes for Water-based Coating Formulations
Jim Reader, Evonik Corporation

Pinholes are a problem for formulators developing fast-drying, water-based coatings, especially in coatings cured at high temperature and applied at high wet film thickness. Pinholes are often caused by air or solvent vapor release from the film when the coating is too viscous to flow back and repair the holes. Pinholes also occur in baked coatings, as the trapped vapor regains mobility when the coating softens under heating, before crosslinking hardens the film, preventing flow back into the voids. Hydrocarbon-based defoamers help eliminate the foam and pinholes in these formulations, but their limited compatibility results in lower gloss, poor leveling and surface appearance. This paper describes a new additive that combines both deaeration of microfoam and modified surface drying for pinhole elimination. This new additive shows comparable pinhole elimination compared with hydrocarbon-based defoamers, but without compromising formulation compatibility or final coating appearance.

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Water-borne Self Crosslinking Technology for High Performance Low VOC Concrete Coatings
Terri John, Synthomer

The use of a self-crosslinking acrylic latex in sealers for hard substrates such as concrete, protects surfaces from water damage caused by freeze/thaw cycles, stains from dirt, deicing salts, oil and other contaminants. Equally important self-crosslinking technology enhances coating formulations by increasing water resistance that can improve the structural integrity of the concrete by preventing leaching of vital minerals crucial to its strength and durability. In addition, the improved UV resistance protects the concrete, while maintaining an attractive appearance. Several products on the market claim to have these properties. Synthomer (formerly Omnova Solutions) has developed technology for concrete protection that also provides superior blush resistance. An added benefit is good adhesion to multiple substrates. Coatings formulated with this technology can create a sealer that is hard enough to drive on, yet soft enough to be formulated to a VOC of < 50 grams/liter.

Acrylic Satin Paint, Upon Tinting
Otto Soidinsalo, Borregaard

Associative thickeners are commonly used to thicken water based coatings. Their action is based on the hydrophobic interaction between the hydrophobic polymer groups as well as with the surface of the binder latex particles. It is commonly known, that associative thickener based formulations are prone to viscosity loss upon tinting due to the surfactants present in the tinting systems. Microfibrillated cellulose (MFC), a value-added and multifunctional product made of cellulose, consisting of fibers with lateral dimensions in the nanoscale and lengths up to micron scale. The main characteristics of this unique fiber structure is its resembling of both water soluble polymers and insoluble additives, leading to a versatile and efficient alternative to technologies currently available. In this work, the effect of insoluble MFC on the prevention of viscosity loss on tinting was studied with a deep tone base, formulated with hydrophobically modified polyurethane associative thickener (HEUR) together with a non-associative MFC thickener. The formulations were evaluated in terms of viscosity, syneresis, sag resistance, flow and leveling, contrast ratio, gloss, color acceptance and float as well as scrub resistance. We will demonstrate how microfibrillated cellulose can prevent the viscosity loss upon tinting and provide excellent sag resistance without sacrificing the flow properties of the coating.

Dispersing Agent Design for Improved Corrosion Resistance in Metal Coatings
William Ruth, Lubrizol, Inc.

As water-borne coatings are increasingly preferred over solvent-borne systems and single-coat over multi-coat for metal protective coatings, the requirements for performance enhancing additives and especially pigment dispersing agents has never been greater. One of the ongoing challenges facing water-borne coatings formulation today is the prevention of flash-rust on application and metal corrosion during the life of the coating. Although specialty additives make up only a small proportion of the total formulation, it has become especially necessary to use improved technology dispersants to prevent the destructive effects of corrosion with the goal of increasing coating lifetime while maintaining long term appearance. Recent developments in dispersant design improves water and humidity resistance compared to using conventional dispersants by adding hydrophobicity to the coating. However, these improvements in corrosion resistance can compromise dispersion performance, with limitations on pigment loading and rheological / particle size stability. This presentation will describe the first part of an ongoing study at Lubrizol combining improved understanding and prediction of degradation in direct to metal coatings to guide the development of novel polymeric dispersants which meet or exceed the requirements for high performance water-borne pigmented coatings in terms of corrosion resistance, application, and appearance.

Improving Indoor Air Quality with Amino Alcohols

Mark Langille, ANGUS Chemical Company

Air pollution is one of the world's largest environmental health risks. Moreover, the level of hazardous air pollutants can be five times higher in indoor air than outdoor air. Much of the pollution found indoors comes from VOCs emitted from carpets, furniture, electronics, household cleaners and other synthetic materials. Chronic exposure to these invisible toxins, such as formaldehyde, can create long-term health problems. Due to a multitude of formaldehyde sources commonly found within indoor environments, it is a significant challenge to address the emission of each source individually. Therefore, an attractive solution to reducing indoor formaldehyde levels is through a chemical remediation or scavenging system. One of the emerging trends for the effective removal of indoor air contaminants is the use of functional coatings. We demonstrate how the unique functionality of amino alcohols can help improve indoor air quality by providing high-efficiency formaldehyde scavenging performance when used in waterborne architectural paints and construction applications. Amino alcohol additives are highly effective at low dosages and do not require major reformulation work, enabling the creation of functional coatings to improve indoor air quality.

NEW WATERBASED CROSS-LINKER

Jerry Petersheim, Polyaziridine, LLC

A water-based dispersion cross-linker has been newly developed to improve physicaland chemical properties of water-based coatings, inks, and adhesives. It does so by reacting with acid functional acrylic emulsion and polyurethane dispersion resins to create a durable cross-linked network that results in increase performance properties. The advantage of a water-based cross-linker extends the working pot life of a coatingand creates the opportunity for a 1-k system. It is also much easier to disperse into acoating, ink, or adhesive as a 2-k syst em. These two properties make it easier for production use. This presentation will review the chemistry of the new molecule and compare it to the traditional cross-linkers used for acid functional coatings. Also, test data will beshown in the comparison.

Pinking Discoloration of Solvent Borne Stains

Katherine Kemmann, Sherwin Williams Co.

Pinking discoloration was observed in reformulated solvent based wood stains. While the problem was one that has been seen before, it was very unexpected based on the formula components. The investigation could have stopped after verifying the hypothesis that a bipyridine drier had complexed with iron to make red chromophores– but left the root cause in a puzzled state. Using analytical detective work, the problem was isolated and then replicated in the Analytical Lab. An in-depth study of the chemical reactions driving this phenomenon were explored in the Analytical Lab. The research into this investigation provided an additional benefit; a simple test that can be done in formulation labs to screen for future issues of this nature was demonstrated.

How to achieve better than acrylic performance without acrylics for architectural and masonry paints

Neal Rogers, Vinamil

Abstract Architectural coatings are applied in a wide degree of application scenarios: interior or exterior, dry or wet environments, and porous versus non-porous substrates. Masonry coatings face challenge of being applied on alkaline substrates while delivering a durable finish in outdoor exposure environments. Interior flat coatings designed at high PVC are often produced from vinyl acetate containing copolymers but are limited from use in wet or humid environments such as bathrooms or kitchens due to marginal water resistance. The use of vinyl neodecanoate, commonly known as VeoVa™ monomer, in the polymer backbone gives enhancements of hydrolytic stability, flexibility, and excellent pigment compatibility allowing versatile use for many architectural coating categories. VeoVa copolymer design and its characteristic benefits are introduced. Three coatings case studies are followed for interior flat paint, exterior paint, and masonry paint that demonstrate resistance to alkali, efflorescence, water, and dirt pickup of VeoVa copolymers. Comparisons of VeoVa copolymers versus paints designed from 100% acrylic binders demonstrate the high performance potential of VeoVa copolymer systems.

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Next Generation of Tint Viscosity Stabilizers

Martin Kays, BYK USA, Inc.

Formulating waterborne coatings that can retain their viscosity after tinting has always been challenging especially with deep and neutral bases. Over the years, formulators have developed workarounds to address the issue, but the solutions usually come at the expense of other essential performance characteristics. For example, the loss of flow and leveling with cellulosic thickeners or the slower filling and inconsistency of bases produced at high viscosity to accommodate the viscosity loss. Traditionally the poor viscosity retention of association thickeners like HEURs eliminated their viability to address these concerns. The introduction of the HEAT technology pioneered the use of associative thickeners to help stabilize viscosity loss. However, there were still some performance benefits with the HEUR technology outside of viscosity retention unmatched until now. A new twist on urethanes, developed by BYK, combines unique viscosity retention of HEAT technology with the added benefits of the HEURs allowing the paint formulator to take the next step toward premium performance.

New Ambient Curing Resins for High Heat and Corrosion Resistance

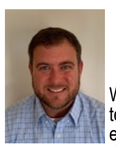
Francisco Cortes Baledon, Evonik Corporation

Methyl / Phenyl Silicone resins are a well-known technology for excellent corrosion protection and heat resistance up to 650°C. Currently, these coatings require curing at elevated temperatures that limits their application on large objects, reducing their scope to smaller pieces such as exhaust mufflers, chimney and oven components and small industrial stoves. A new generation of methyl alkoxy silicone resins have been developed that cure under ambient conditions, while maintaining corrosion protection at permanent high temperatures. The high content of alkoxy functional groups, in combination with specific tin-free and heavy metal free catalysts, allows the hydrolysis – condensation reaction, and therefore cross-linking the system, at ambient temperature. These new, low VOC resins represent a novel technology. enabling application on large industrial structures as heat exchangers, distillation columns or industrial vessels, mostly without interrupting operations. This paper also reviews some specific considerations when formulating these coating systems such as curing conditions and application methods. Performance application data is also presented.

FACTORS AFFECTING SEALER PERFORMANCE ON CONCRETE

Jim Reader and Gary Johnon, [1] Evonik Corporation

It is often assumed that solvent-based sealers give better performance than water-based formulations on concrete because the solvent-based sealers are assumed to penetrate better into the concrete matrix. In practice, it can be difficult to measure actual penetration of a sealer into concrete, as dyes and colorants used to highlight the sealer may show different migration properties than the polymeric binder. Confocal Raman spectroscopy mapping has been used to map the depth of penetration of solvent-based, 100% solids and water-based sealers that employ acrylic and epoxy binders. This mapping shows that neither solvent-based nor water-based formulations showed any significant penetration into the concrete substrate beyond the first few microns of the open surface. A study has also been carried out using a model waterborne acrylic sealer formulation to determine whether additives might influence the penetration of the sealer into the concrete or other factors that could affect the performance of the waterborne coating. This work has shown that the addition of anti-foaming, coalescing surfactants can improve the protective properties of the coating by improving air release and increasing film network formation at the concrete surface.



Economical, Self-crosslinking Waterborne Acrylics for Industrial Coatings

Derek Koonts, Alberdingk Boley, Inc.

Waterborne acrylic polymers are one of the dominant resin technologies used in industrial coatings today. They offer excellent UV resistance, good physical properties, good durability and multiple options for polymer design to meet various application needs. Unlike solvent based polymers, waterborne acrylic polymers are more environmentally friendly with lower volatile organic compounds (VOC's) and hazardous air pollutants (HAPS). This in turn allows end users to reduce their environmental footprint while maintaining final

product quality. While there have been new developments for water-based acrylics, the demand for new products continue to thrive as coatings formulators strive to meet the increasing regulations of these compounds without losing performance and maintaining relatively low costs. This presentation will focus on a new multi-phase, self-crosslinking acrylic that provides superior performance properties such as excellent chemical resistance, high hardness and excellent block resistance as a one component system. Due to its broad formulation latitude, this acrylic can be blended with other waterborne polymers, including waterborne UV curable polyurethane dispersions (PUDs) and hydroxy functional acrylics. Two component formulations will also be discussed. With these possibilities, data will be presented to show the versatility of this product in a variety of applications ranging from industrial wood markets to building products where high end coatings are needed.

Novel Synthetic Silica for Matting Powder Coatings

Bob T. Lin and Bernhard Resch, Evonik Corporation

Powder Coatings have continued to broaden its application to protect a greater range of substrates. With this expansion, more chemistries are being developed for differing substrate compositions. These include lower temperature cure to address heat sensitive substrates and/or lower energy consumption to reduce cost. These applications also require aesthetics that require consistent matte finishes. Although there are several additives technologies being employed, the stringent need for greater uniformity in the final coating is still a challenge. In this study, the paper reviews the range of available additive technologies that are currently being employed for matting powder coatings, then introduces a novel synthetic silica technology and examines its impact on matting in powder coatings. The study will look at how this influences processing of powder, usage of the novel synthetic silica, main effects on matting and other performance characteristics of the final powder coating. The results will provide a comparable overview of how the new novel synthetic silica performs versus current available technologies.