

# 新一代助剂：提高多涂层体系的可重涂性！ Next-Generation Additives: Improve the Recoatability in Multi-layer Coatings!

Dr. Horst M. Sulzbach 博士, Mark Heekeren,  
Dr. Marc Eberhardt 博士, Dr. Guillaume W. Jaunky 博士<sup>①</sup>  
毕克化学公司 BYK-Chemie GmbH



许多高质量产品如移动电话塑料涂层或汽车金属涂层涉及多道涂层，必须很好地调整不同涂层例如底漆、面漆和清漆之间的表面张力和表面能。然而，通常情况并非理想，因为涂层来自不同供应商，可能在施工过程中引起问题，导致涂层的润湿甚至层之间的附着不充分。

## 各种可实现更好润湿效果的方法

改善基材润湿的经典方法是使用助剂，可降低待施工涂层的表面张力。但是如果待涂覆涂层表面能相对较低，那么这个方法有风险。

针对多涂层涂料体系，使用基材润湿剂已经不是一个新的独特的方法，而是通过提高待涂覆涂层的表面能，从而使后续涂层不需要进行额外的改性。

## 结构的决定性

第一代的流平剂是标准烷基丙烯酸酯或烷基甲基丙烯酸酯的均聚物或共聚物(图1a)。(共)聚合物链的结构是线性的，基于聚丙烯酸酯的流平剂具有相对较低的玻璃化转变温度并且与涂料体系轻微不相容，因此，聚合物链位于涂层表面上并在固化过程中保持表面张力恒定，从而产生平整外观。

通过研究影响涂料的表面张力和固化涂层的表面能，新一代流平剂的开发提供了额外的益处。这些梳状共聚物结构在技术上可通过使用特殊的官能化低聚物(即所谓的「大分子单体」)获得。丙烯酸酯大分子单体基本上是预聚合单体的集合体，通过改性使其能通过添加一个可聚合双键而充当单体(图1b)。

图2很好地阐述了三代流平剂之间的区别，包括化学结构和应用性能。

## 有机硅 / 聚醚大分子单体组合产生差异

在传统的基于聚酯和氨基树脂的单组份 OEM 底漆中测试了助剂，并和经典的有机硅助剂(聚醚改性有机硅)或丙烯酸酯流平剂进行对比。测试结果见图3。只有包含聚醚和有机硅大分子改性的4、5和6结构助剂的表面能较高，这个结果清晰地反应了4、5和6结构助剂能更高效地向界面定向移动。

如底漆表面涂有水性红色漆，则可以非常清楚地看到表面能对后续层润湿的影响(图4)。

在对比试验中，对照组即未改性的底漆可被15微米以上干膜厚度的红色漆润湿，但假如在底漆中使用0.3%的结构4助剂，该厚度减少到只需大约8微米。

## 即使在较低固化温度下也能提高效率

在室温或低温下固化的水性体系中，具有结构3的助剂通常在表面没有足够的定位来实现表面能的显著增加。如图5所示，在体系中添加硅氧烷和聚醚大分子单体改性的结构4或6助剂能明显地增加表面能。尽管结构6硅烷链较长，但有趣的是，具有结构6的助剂比具有结构4的助剂导致更大表面能的增加。这是因为随着硅氧烷链长增加，助剂变得不相容，因此有利它们朝向涂层-空气界面的定向移动。

## 随时关注流平

这些新结构的助剂在水性面涂体系中也有应用。在这些体系中对涂覆涂层的润湿通常通过经典的有机硅助剂来

Many high quality products involve multi-layer coatings, for example, on plastics for mobile telephones or on metal for automobiles. The surface tensions/energies of the different layers such as filler, basecoat and clearcoat have to be well adjusted. Frequently however, this is not the case because the coatings stem from different suppliers. This can cause problems during processing, with the result that the wetting of the layers, or even the adhesion between the layers, is not sufficient.

## Various ways of achieving better wetting

The classic approach to improve substrate wetting is to use an additive, which reduces the surface tension of the coating to be applied. This method has many disadvantages in multi-layer coatings if the underlying layers have relatively low surface energies.

A new and unique opportunity for multi-layer coating systems is not to use a substrate wetting additive, but to raise the surface energy of the underlying coating so that no additional modification of subsequent coating is needed.

## The structure is decisive

The first generation of leveling additives are homopolymers or copolymers of standard alkyl acrylates or alkyl methacrylates

(Figure 1a). The structure of the (co)polymer chain is linear. Leveling additives based on polyacrylates have a relatively low glass transition temperature and are slightly incompatible with the coating matrix. The polymer chains are therefore located on the surface of the coating and keep the surface tension constant during the curing process, thus creating a smooth appearance of the surface.

The development of the next generations of leveling additives provide additional benefits by influencing the surface tension/energy of liquid/cured coatings. These comb copolymer structures are technically accessible through the use of special, functionalized oligomers, the so-called "macromonomers". An acrylate macromonomer is essentially an assembly of pre-polymerized monomers modified to enable it to act as a monomer through the addition of one polymerizable double bond (Figure 1b).

To better illustrate the effects of the different additive chemistries, the following chart compares the 3 generations and their properties from an application perspective (Figure 2).

## Silicone/Polyether macromonomers combination creates the difference

The additives were tested in a conventional 1K-OEM primer

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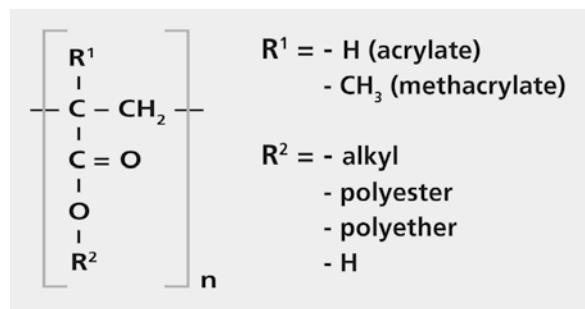


图 1a：重复单元的聚丙烯酸酯  
Figure 1a: Repeating units of polyacrylates



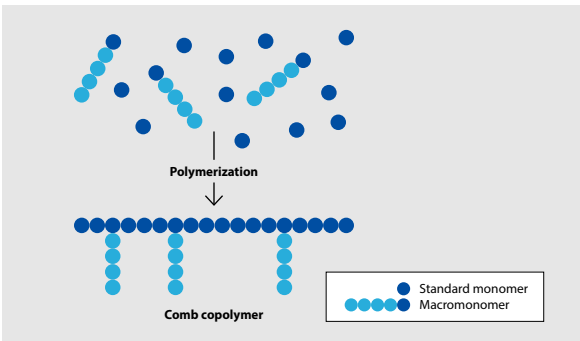


图 1b：大分子单体技术  
Figure 1b: Macromonomer technology

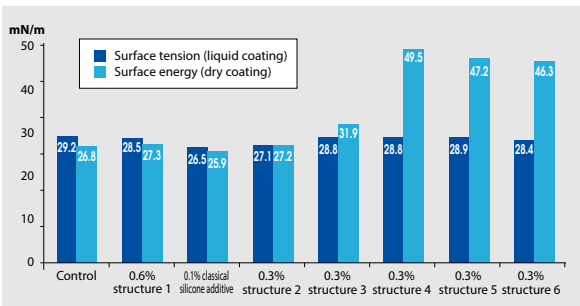


图 3：传统原产汽车底漆表面张力和表面能测试。测试体系：基于 Setal® 1671SS-65, Setamine® US-138 BB-70 和 Epikote® 1001 的溶剂型底漆。试验方法：应用：在带有电泳底漆的钢板上静电旋杯喷涂，固化条件：闪干 10 分钟，160°C 烘烤 20 分钟。  
Figure 3: Measured surface tensions and surface energy of a conventional OEM automobile primer. Test system: solvent-based primer based on Setal® 1671 SS-65, Setamine® US-138 BB-70, Epikote® 1001. Test method: Application: Bell application on electro-coated sheets, curing conditions: 10 min. flash-off, 20 min. at 160°C.

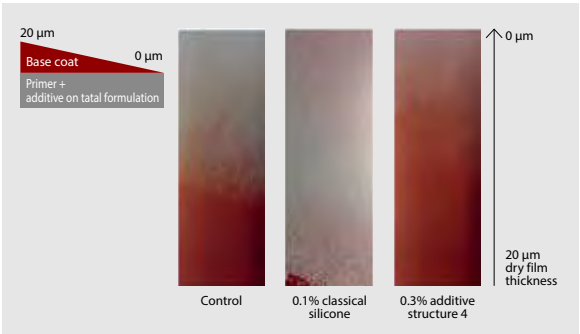


图 4：润湿行为：底漆表面能的增加改善了色漆对其的润湿性  
Figure 4: Wetting behavior: an increase in the surface energy of the primer improves the wetting of the basecoat

实现。这些助剂通常用于提高涂层防缩孔性能，并产生光滑的表面。事实上，这些有机硅会导致表面能降低，但是对单涂层来说没有风险。如为了修复或美观（例如双色涂饰）而须再次涂覆面漆涂层，较低表面能不仅会导致较差的润湿，而且会导致较差的流平。然而具有较短硅氧烷链（结构 4）的助剂未显示出摩擦系数的降低（表面滑爽没有增加），但具有较长硅氧烷链（结构 5 和结构 6）的助剂导致显著的表面滑爽增加（图 2、图 6）。

## 未来是大分子单体

改善重涂性的新方法是在底层涂料中使用基于亲水性大分子单体的助剂。最新一代的亲水性助剂增加了抗缩孔性和滑爽性。




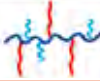
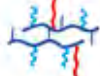
第一代标准聚丙烯酸酯 1st generation standard polyacrylate	流平 Leveling	线性链段 Linear chain		结构 1 Structure 1
第二代有机硅或聚醚 - 大分子单体改性 2nd generation silicone or polyether-macromer modified	抗缩孔，不影响表面能 Anti-crater effect without influence on surface energy	线性主链和长链有机硅大分子 Linear main chain and long silicone macromer		结构 2 Structure 2
	高表面能和改善流平性 High surface energy and improved leveling	支化主链与聚醚大分子 Branched main chain with polyether macromer		结构 3 Structure 3
第三代有机硅和聚醚 - 大分子单体改性 3rd generation silicone and polyether-macromer modified	高表面能，提高流平性， 轻微抗缩孔 High surface energy and improve leveling, slight anti-crater effect	线性主链和短链有机硅大分子 Linear main chain and short silicone macromer		结构 4 Structure 4
		线性主链和中等长度链段有机硅大分子 Linear main chain and medium silicone macromer		结构 5 Structure 5
		支化主链和中等长度链段有机硅大分子 Branched main chain and medium silicone macromer		结构 6 Structure 6

图 2：传统和创新流平剂的结构示意图  
Figure 2: Schematic structure of conventional and modern leveling additives

■ 聚丙烯酸酯 Polyacrylate ■ 聚醚 Polyether ■ 有机硅 Silicone

based on polyester and melamine binders, and compared with classical silicone additives (polyether modified silicones) or standard acrylate-based leveling additives. The results are summarized in Figure 3. Only the structures that contain polyether macromonomer combined with silicone macromonomer as in structures 4, 5 and 6, can orientate themselves more strongly towards the interface - a fact that is clearly reflected in the higher surface energies measured.

The influence of the surface energy on the wetting of the subsequent layer can be seen very clearly if the primer surfacer is overcoated with a waterborne red basecoat (Figure 4).

In this comparative test, the "unmodified" primer (control) could be wetted by the red basecoat in a continuous layer by using ~15 µm dry film thickness, but by using only 0.3% structure 4 additive in the primer this thickness could be reduced to just ~8 µm.

## Increased effectiveness even at lower curing temperatures


In waterborne systems, which are cured at room temperature or at low temperature, the additive with structure 3 often does not orient sufficiently at the surface to achieve a substantial increase in surface energy. As can be seen in Figure 5, a considerably greater effect can be achieved in these systems with the combined silicone macromonomer and polyether macromonomer structures 4 and 6. The fact that the additive with structure 6 causes a greater increase in the surface energy than the additive with structure 4 despite longer silicone chains, appears contradictory. This is due to the additives becoming increasingly more incompatible the longer the silicone chain, and thus favoring their orientation towards the coating-air interface.

## An eye on the waviness at all times

The new structures are also interesting in hydro topcoat systems. The wetting of the underlying coating in these systems is usually produced by means of classical silicone additives. These additives are normally used to make the coating crater-resistant as well and create a smooth surface. In fact, these silicones cause a reduction in the surface energy. This does not, however, constitute a problem with single coating. Nevertheless, if the topcoat has to be overcoated again for the purpose of repair or optical appearance (for example two-color finish), the lower surface energy causes not only poorer wetting but also poorer leveling. While the additive with

the shorter silicone chain (structure 4) showed no reduction in coefficient of friction (no increase of surface slip), the additives with longer silicone chains (structure 5 and structure 6) caused a significant surface slip increase (Figure 6).

## The future is macromer

A "new" approach for overcoatability is to use hydrophilic macromonomer-based additives in the underlying coatings. The latest generation of hydrophilic additives add anti-cratering behavior and increased slip. 

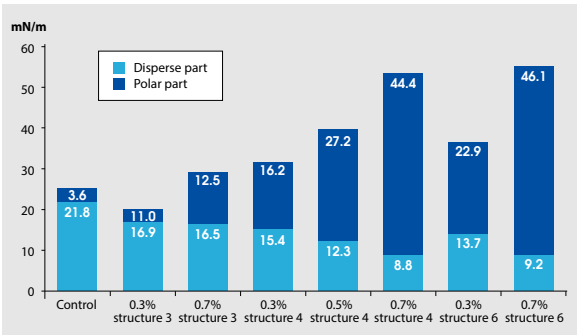


图 5：80°C 下固化 10 分钟后水性底涂层的表面能  
Figure 5: Measured surface energy of a waterborne basecoat after curing for 10 minutes at 80°C.

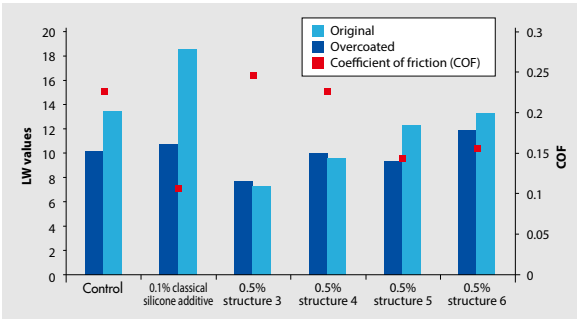


图 6：直接施杯喷涂白色水性面漆和对自身修复重涂后的涂层的流平对比，以及这些涂层的滑爽测量结果。  
Figure 6: Measurement of the leveling of bell applied white water-based topcoat directly and after repair with itself, and slip measurement of these coatings.

# 可持续材料推动行业下一波增长势头 Sustainable Materials Unlocking the Next Wave of Growth

Prof. Jamil Baghdachi 教授

美国东密歇根大学 Eastern Michigan University, USA



多年来，全球涂料行业一直致力可持续发展，近年来更取得显著进步。新订环保法规和个别客制需求，亦推动可持续发展；此外，在环保热潮下，一些企业更将可持续发展拟为公司的发展目标。

实际上，有多种方式来实现可持续发展。绿色化学是通过减少或消除使用和/或产生有害物质而设计的化学产品和加工设计。

近年来，涂料原材料供应商和涂料制造商已获得全球独立第三方认可。阿克苏诺贝尔评为全球领先企业，Becker Industries<sup>[1]</sup> 在建筑行业中使用高太阳能反射率和发射率涂层而获得英国涂料联合会颁发「可持续创新奖」。

普遍认为，涂料造成的环境问题，10% 在配方中产生，50% 由原材料生产，40% 来自使用时和弃置后；因此，涂料行业整个供应链也有影响。

The coatings industry worldwide has been addressing sustainability for some years, with considerable progress in recent years. Some of this improvement has been driven by legislation and some designed to address specific customer needs. There have also been examples of voluntary initiatives by companies with a strong environmental ethos.

In practice, sustainable solutions can be achieved in many ways. Green chemistry is the design of chemical products and processes that reduce or eliminate the use and/or generation of hazardous substances.

In recent years, coatings raw material suppliers and coatings manufacturers have been recognized globally by independent third parties. AkzoNobel has been ranked as the leader worldwide and Becker Industries<sup>[1]</sup> received the Sustainable Innovation Award from the British Coatings Federation for its work on high solar reflectivity and emissivity coatings for use in the construction industry.

It is generally accepted that 10% of the environmental footprint of coatings is created during formulation, 50% generated by raw materials and 40% created in use and disposal. Therefore, the industry can impact the footprint of the whole supply chain.

## The way forward must be economically feasible

For sustainability to come at no added cost the only compromise we make is to think and act differently.<sup>[2]</sup>

Novel chemistry has an important part to play in environmental footprint reduction. Recent examples include:

- The development of an additive for internal decorative wood coatings that reacts with formaldehyde and blocks its release (Dow<sup>[3]</sup>),
- Acrylic grafting on to alkyds to change their morphology to avoid the need for both solvents and surfactants (Arkema<sup>[4]</sup>),
- Partial replacements for titanium dioxide through Solvay's calcium carbonate product range<sup>[5]</sup>.

Corbion Purac<sup>[7]</sup> supplies lactide building block chemicals made by the fermentation of sugars that can enable polyester resin producers to create modified resins with improved property profiles in their final application.

Bayer<sup>[9]</sup> has developed tailor-made polyether carbonate polyols from propylene oxide and carbon dioxide. Brown University<sup>[10]</sup> has made a breakthrough in the manufacture of acrylates using ethylene and carbon dioxide with nickel as a promoter.

## Achieving sustainability through multi-functionality & enhanced coatings lifetime

With 40% of the environmental footprint downstream of the factory gate, improvements in paint performance can have a significant impact on the sustainability of the entire life cycle.





## 亚什兰水性涂料解决之道 流变,消泡相辅相成

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欢迎莅临2018中国国际涂料展  
展位号: 2.1 D31-36



### 发展道路必须经济可行

为实现可持续性而不增加成本,我们就要采用不一样的思维方式和行动<sup>[2]</sup>。

- 新化学减少对环境的影响发挥着重要作用,最近的例子:开发用于室内木器涂料的添加剂,能与甲醛起化学反应并阻止其释放(陶氏<sup>[3]</sup>);
- 把丙烯酸嫁接到醇酸树脂上,改变其形态后可不需要溶剂和表面活性剂(阿科玛<sup>[4]</sup>);
- 索尔维的碳酸钙产品系列,替代部分二氧化钛<sup>[5]</sup>。阿克苏诺贝尔<sup>[6]</sup>承诺,到2020年将翻倍增加采购可再生成分的原材料。

Corbion Purac<sup>[7]</sup>提供糖类发酵制成的丙交酯结构单元,使聚酯树脂生产商能够在最终应用中生产出具有改进性能的改性树脂。

拜耳<sup>[9]</sup>采用环氧丙烷和二氧化碳开发了定制的聚醚碳酸酯多元醇,美国布朗大学<sup>[10]</sup>则使用乙烯和二氧化碳及镍作为促进剂来生产丙烯酸酯,这方面取得了突破。

### 以多功能和增强涂料寿命实现可持续性

下游工厂造成40%的环境问题,因此,改善油漆性能可对整个生命周期的可持续性产生重大影响。

多功能原材料和涂料,如自愈聚合物/涂料和无底漆绝缘涂料,可减少时间和能源消耗、腐蚀感应,现在商业上的高性能涂料,加强产品持久性并减少对新材料和重涂的需求。在过去十年,从建筑到航空航天的大多数涂料性能都显著提高,却没有标签为可持续解决方案。

可持续涂料不仅仅提供装饰和保护,增强功能更显著改善原材料供应商下游行业的可持续性。低排放、耐刮擦、热和光反射、气味吸收、薄膜涂层、涂料等,皆是这种材料的实例。重要的是,要考虑不是购买时的价格,而是可持续材料使用期的成本。

中国「十三五」期间发展旨在加强各个关键领域和核心竞争力,通过制定完善标准和激励政策,促进新材料产业发展。中国政府建立专业化产业园区,加大支持材料应用以推动工业生产规模;加快制定新材料标准,逐步展开超导体、纳米材料、石墨烯、生物基材料等尖端材料研究。

### 准备迎接涂料行业增长浪潮


涂料行业中,生物基材料使用不断增加。根据美国全球市场洞察(Global Market Insights),到2024年生物基涂料市场规模将超过13亿美元。今年,在「第二十三届中国国际涂料展」中,中国参展商展品包括可持续原材料增长约8%,许多参展商扩大了他们可持续原材料产品系列,一些首次参展公司更是专门生产生物基产品。随着越来越多生物基产品出现,实际上为涂料行业创造了更多和新的市场空间。

Multifunctional raw materials and coatings such as self-healing polymers/coatings and primer-less insulating coatings reduce time and energy consumption, corrosion sensing; high performance coatings which are commercial now increase durability of products and alleviate the need for new material and recoating. In the past decade the performance of most coatings from architectural to aerospace has been improved dramatically without labeling them as sustainable solutions.

Sustainable coatings can do more than decoration and protection. Enhanced functionality can bring significant improvements to the sustainability of downstream industries in their raw materials suppliers. Low emission, scratch resistant, heat and light reflecting, odor absorbing, thin film coatings and paint are examples of such materials. It is important to consider the cost of a sustainable material over its life time as opposed to its price at the point of purchase.

Development during the China's 13th Five-Year Plan period aims at cultivating key areas and core competencies, and will promote growth in the new materials industry by devising improved standards and incentive mechanisms. Chinese Government has stepped up support for the application of the material to achieve industrial scale through the establishment of specialized industry bases. Meanwhile, new materials standards are being formulated more quickly, and early phase research on strategic cutting-edge materials such as superconductors, nanomaterials, graphene and bio-based materials is gradually starting.

### Get ready to ride wave of coatings industry growth

The industry has seen increased use of sustainable materials in coatings. According to Global Market Insights, the market size of bio-based coatings will exceed US\$1.3 billion by 2024. CHINACOAT2018 has also witnessed about 8% growth of local exhibitors who will showcase sustainable raw materials. A number of regular exhibitors have expanded their sustainable raw materials and several new exhibitors actually specialize in manufacturing bio-based products. As more bio-based products become available, more and new markets space are being created. 

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## 涂料市场面对各种压力下的新景象 Coatings Market Advances under Multiple Pressures

**王韧 Arnold Wang**

《中国涂料工业》特约撰稿人

Contributing Writer, China Coatings Journal (CCJ)



进入 2018 年，中国涂料市场遇到前所未有的压力，原材料价格持续走高、政府法规力度加大和激烈的市场竞争等。中国涂料企业必须应对这些挑战，同时还要满足下游客户提出的新需求。只有那些对市场趋势可快速反应的人才能继续成长，甚至扩大市场份额。而数千家涂料公司已在竞

争中失败并退出市场。

### 水性涂料增长速度远远超过整个涂料市场

中国颁布了许多环保法规来保护环境，实施也越来越严格，目的是推动涂料终端用户采用环保技术。高性能水性聚

Entering 2018, the Chinese coatings market met unprecedented pressures, including continuous high price for raw materials, stricter implementation of government regulations, new competitions, etc. As a result of this, China's coatings industry has to address these challenges and, at the same time, meet new demand from their downstream customers. Only those who respond to market trend quick enough can continue to grow and even expand their market share. On the contrary, thousands of coatings companies failed when facing competition and retreated from the market.

### Waterborne coatings grow much faster than the whole coatings market

China introduced many environment regulations to protect the environment, and their implementation are getting stricter and stricter, pushing coatings end users to adopt environment friendly technologies. High performance waterborne polyurethane, waterborne epoxy and UV technologies are expanding their customer base quickly and taking away market shares which used to be held by solvent based coatings in the past. Government supervision speeds up the development and adoption of waterborne



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氨基、水性环氧树脂和 UV 技术正在迅速扩大其客户群，并夺走过去溶剂型涂料持有的市场份额。政府监督加速了汽车涂料、木器涂料、容器涂料、建筑涂料等许多市场，特别是一二线城市的水性技术开发和采用。水性 UV 涂料技术已用于出口到美国和西欧的木制家具。

此外，帝斯曼和巴德士等粉末涂料公司正试图打入木器涂料市场。本地市场的发展受环保技术和应用性能的驱动。这为海外公司引进新技术提供了更多动力，外资公司拥有比中国国内公司开发水性涂料技术更长的历史。

一些快速增长的市场，如新能源汽车、高速列车和水性汽车修补漆市场都倾向品牌制定度高和质量稳定的外国品牌。

但溶剂型涂料在中国本地涂料市场仍占重要一席，这种情况不会一夜之间改变。成本和性能方面的考虑使下游客户很难立即采用水性技术。新增固化设备、严格的涂装环境、高成本的涂料、光泽等级、新产品硬度等都需要在被评估，因此这不是一个容易的决定。因此，涂料生产商通常要求下游客户提供一站式解决方案，不仅包括环保配方，还包括其配套的喷涂工艺。新的客户需求正在推动中国涂料行业改善其产品及服务。

## 中国可能为电子束固化技术提供一个很好的机会

虽然水性技术相对容易被下游客户接受，但市场也欢迎其它绿色技术，如紫外线和电子束 (EB) 固化涂层。与 UV 涂料在中国的快速发展相比，EB 涂料还没有在行业内普及。但今年这情况可能会有所改变。

一些像北人这样的公司已通过引入 EB 固化机来测试市场。而 EB 涂料的目标市场包括木地板、橱柜、门、塑料包装等。

## 未来建筑涂料公司关注预制装配式建筑的发展

2016 年中国政府表示，预制装配式建筑将在十年内占新建建筑的 30% 份额。这个新趋势将在未来把涂装工作从建筑工地转移到工厂，意味着涂装工作质量将得到改善，天气和外部环境不会成为主要考虑因素。

总体来说，小型涂料公司由于缺乏市场差异化而停止运营，他们的市场份额会被其它企业占用。另一趋势是，政府正将涂料公司的生产厂房转移到工业园。可预见的是，涂料公司的数量将会减少，而每家公司的产能将会增加。因此，整个中国涂料行业发展将更加健康。

technologies in many markets, such as automotive coatings, wood coatings, container coatings and architecture coatings, and especially in tier 1 and tier 2 cities. Waterborne UV coatings technologies have been used on wood furniture exported to American and west Europe. Besides, powder coatings companies including DSM and Bardese are trying to break into the wood coatings market.

Development of the local market is driven by environment friendly technologies and application performance. This provides more momentum for new technologies to be introduced by foreign companies, whose development of waterborne coatings technologies have a longer history than Chinese domestic companies. Some fast growth markets such as new energy cars, high speed trains, and waterborne car refinish markets all favor foreign brands, which have higher brand image and provide consistent quality.

But the Chinese local coatings market is still controlled by solvent based coatings, and this situation will not change overnight. Cost and performance considerations make it difficult for downstream customers to adopt waterborne technologies immediately. Extra curing equipment, strict painting environment, high cost of waterborne coatings, gloss grade and hardness, etc, are all needed to be evaluated when making the change, and it is not an easy decision. So coatings producers are always requested by downstream customers to provide one stop shop solution which include not only environment friendly formulas but also their matching painting process. The new customer demand pushes China's coatings industry to improve their product offering and services.

## China might offer a good chance for EB technologies

Although waterborne technologies are relatively easier to be accepted by downstream customers, the market is open to all green technologies, such as UV and electron beam (EB) coatings. Comparing with UV coatings' fast development in China, EB coatings has not had a strong presence yet. But this situation might see some changes in this year. Some companies such as Beiren has tested the market by introducing their EB curing machine into the market. And the target markets for EB coatings include wood floor, kitchen cabin, door as well as plastic packaging, etc.

## Architecture coatings companies prepares for the coming of prefabricated buildings

In 2016 Chinese government said prefabricated buildings will hold 30% share of new constructed buildings in 10 years. This new trend will move painting job from construction sites to factories in the future, meaning painting job's quality will be improved and weather and external environment will not be major considerations.

Many small coatings companies stopped their operations due to lack of business differentiation, and their shares were taken by those companies left still in the market. Another trend is that the government is moving production facilities of coatings companies into industrial parks. It is foreseeable that the number of coatings companies will be reduced and each company's production capacity will be increased in the future. As a result of this change, the whole Chinese coatings industry's development will be healthier. □



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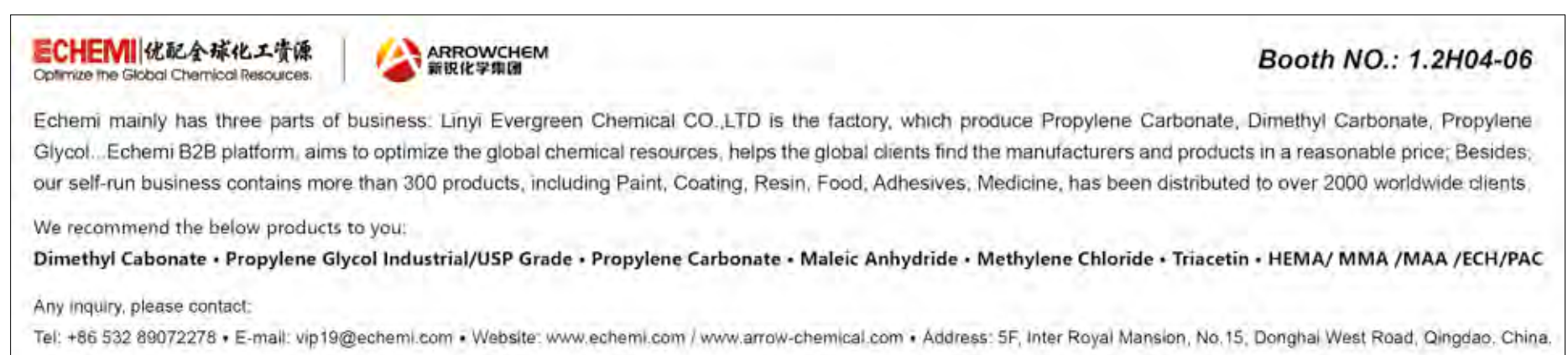
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## 探索本届展会创新产品及技术 Explore Innovative Solutions & Products at CHINACOAT2018 Guangzhou

随着市场对额外功能和技术可持续性的要求不断提高，全球涂料市场正在迅速变化。以下介绍本届部分参展公司的崭新解决方案、技术及产品。

The global coatings market is rapidly changing with increasing demands for new technologies that offer additional functionalities and improved sustainability. Take a look at this section for innovative solutions and products from some of our exhibitors.

### 海名斯 NUOSPERSE<sup>®</sup> FX 7500W 水性高分子润湿分散剂 Elementis's NUOSPERSE<sup>®</sup> FX 7500W waterborne polymeric wetting & dispersing agent

NUOSPERSE<sup>®</sup> FX 7500W 是新一代水性高分子型润湿分散剂，设计用于水性工业涂料与油墨中的颜料润湿与分散，其结构特征具有特殊的多元颜料亲和基团与水兼容高分子链段，可在颜料表面形成牢固的吸附层，并透过空间位阻来保护颜料。产品可降低研磨时间与研磨浆粘度，防止颜料絮凝并优化展色性与光泽。NUOSPERSE<sup>®</sup> FX 7500W 本身的双亲结构可提供颜料的润湿效果又不受体系中电解质影响，仅需找出其最适添加量，可大幅减少涂料配方设计的复杂度。

NUOSPERSE<sup>®</sup> FX 7500W is a new generation waterborne polymeric dispersant which is designed for pigment wetting and dispersing in waterborne industrial coatings and inks. It contains special structure of multiple pigment adsorption groups and water compatible polymer chains which can strongly adsorb onto pigment surfaces and protects pigments through steric hindrance. It reduces pigment grinding time and mill base viscosity; prevents pigment re-flocculation and optimizes color development and gloss. NUOSPERSE<sup>®</sup> FX 7500W has dual-functional structure which provides wetting and dispersing functions without being influenced by electrolytes in the system. The coating formulation can be easily designed by testing optimal dosage of NUOSPERSE<sup>®</sup> FX 7500W.

展台号 Booth No.: **1.1E01-12**

### 凯碧 UV 加硬液 /UV 胶 KOBAYASHI's UV curing solution/ UV resins

凯碧将展出数款产品，其中包括：UV 加硬液 /UV 胶 - 针对透明基材（如 PC、PMMA）；保护膜 - 保护 ITO 膜不受蚀刻液的影响，适用于荧幕印刷、无残渣易剥离（手动剥离）；绝缘油墨 - 防尘、隔热、防潮，保护回路不受灰尘、湿度、湿气等外部因素影响，防止导电涂层的氧化和移位，以及回路间的短路。

KOBAYASHI will exhibit: UV curing solution/ UV resins - suitable for transparent substrates, such as PC and PMMA; Protective film - protects the ITO film from the influence of the etching solution, suitable for screen printing, no residue and easy peeling; Insulating paints - dustproof, heat-insulating, moisture-proof, etc. and preventing oxidation and displacement of conductive coating, as well as short circuits.

展台号 Booth No.: **4.1C27**

### 核心 Hyperlev F40 水性工业漆用润湿剂 Corechem's Hyperlev F40 waterborne wetting agent

上海核心新材料科技有限公司的 Hyperlev F40 水性工业漆用润湿剂，双子星结构有机硅，超级润湿，极佳入孔性，自带消泡功能，兼具良好的流平。

Corechem (Shanghai) New Material Technology Co., Ltd. will showcase Hyperlev F40, a waterborne wetting agent, made of Gemini silicone, acquires the characteristics of super wetting, porosity, self-defoaming, leveling.

展台号 Booth No.: **2.2D17-24**

### BYK-3456 有机硅表面助剂 BYK-3456 silicone-containing additive for improving substrate



BYK-3456 不含氟有机硅表面助剂能极大地降低动态和静态表面张力。甚至对于粗糙和多孔的基材（比如木材），它都能极好地润湿。能同时作用在基材和涂料体系的固液界面以及涂料体系与空气的气液界面，改善基材润湿能力和流平，不稳泡。

BYK-3456 is a fluorine-free silicone additive that greatly reduces the dynamic and static surface tension. Even rough and porous substrates (e.g. wood) are wetted perfectly. As BYK-3456 is active both at the interface to the substrate and at the surface, the additive simultaneously improves substrate wetting and leveling. In contrast with many other additives, however, BYK-3456 does not stabilize foam.

展台号 Booth No.: **1.1D01-10**

### 亚什兰 Natrosol<sup>™</sup> HMHEC 系列： 稳定不流挂 Ashland's Natrosol<sup>™</sup> HMHEC series: stable and no sagging

助溶剂是水性工业涂料配方中主要的原材料之一，但对于常用的缔合型增稠剂而言，助溶剂会破坏其建立的缔合作用，某些涂料体系容易出现增稠效率低、稳定性差、施工流挂等问题。亚什兰 Natrosol<sup>™</sup> HMHEC 系列产品应用于水性工业涂料，尤其是在双组份环氧和环氧树脂配方中，可以明显的提高增稠效率；使涂料长期储存后，粘度更稳定，色漆不浮色；在施工喷涂过程中，抗流挂性能优异。

Cosolvent is one of the major raw materials in waterborne industrial coating formulations. However, for commonly used associative thickeners, the cosolvent can destroy its established associations. Some coating systems may create several issues, such as low thickening efficiency, instability, and sagging. Ashland's Natrosol<sup>™</sup> HMHEC series are used in waterborne industrial coatings, especially in two-component epoxy and epoxy resin formulations, which can significantly increase the thickening efficiency. Long-term storage coating, its viscosity becomes more stable with no paint float color issue, and excellent anti-sagging performance during spraying.

展台号 Booth No.: **2.1D31-36**

### 吉力水性防腐涂料树脂 JELEE's waterborne anti-corrosive coatings resins

吉力的丙烯酸-环氧交联体系以有机硅改性丙烯酸树脂为主体树脂，通过和环氧乳液的交联反应，使成膜具有丙烯酸的快干和高表面效果，引入环氧树脂的高防腐能力。制备的涂料具备适应各种恶劣涂装施工环境下的下线干率，做到下线即可码垛、堆叠，耐中性盐雾超过 300 小时，实干硬度超过 1 小时，具备长达 15 天的活化期。耐候性能力强，适用于工程机械产品的底面合一和面漆领域。

JELEE's acrylic-epoxy system mainly contains silicone-modified acrylic resin. The crosslinking reaction with the epoxy emulsion allows the coatings film formation to acquire both advantages of acrylic and epoxy resins, including fast drying, good anti-corrosive properties, and high-performance finishing. The production time of coatings, made of these materials, is equivalent to that of solvent-based products. Its salt fog resistance is about 300 hours with 1h of full dry hardness, and 15 days of pot life. It can be used to prepare primer top coatings for various machinery products due to its high durability.

展台号 Booth No.: **2.2D17-24**

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新一代的 TS6200 采用了无定形氧化铝和二氧化硅的双重复配包覆处理技术，不仅使涂层具有更优异的保光保色性，还提升了遮盖力和光泽水准。同时该颜料使用的创新型的有机处理进一步增强其在涂料体系中的润湿分散性，在水性体系中相对传统的耐候性钛白粉规格能够显著减少分散润湿剂的需求量，进而帮助漆膜提升抗性，是开发耐候型水性工业漆的绝佳选择。

The new generation of the TS6200 uses a dual-repeat coating process of amorphous alumina and silica, which not only provides superior gloss and color retention, but also improves hiding power and gloss. At the same time, the innovative organic treatment of the pigment further enhances its wetting and dispersibility in the coating system. In the aqueous system, the relatively traditional durability TiO<sub>2</sub> can significantly reduce the demand for dispersing wetting agent, thereby helping the film to enhance resistance, and would be an excellent choice for developing weatherable waterborne industrial paints

展台号 Booth No.: **2.1B01-06**

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Biuged's multi-functional high speed  
dispersing machine

BGD 745 多功能高速分散机是标格达公司收集广大客户建议开发出来的一款新产品，获得国家多项专利。特征：新型直流无刷电机；调速范围宽；转速反馈系统；直接显示当前分散盘工作的线速度；新型自动定位夹紧料筒装置高品质一体式搅拌轴物料温度监控功能定时搅拌功能；圆弧底夹层料筒。

BGD 745 multi-functional high speed dispersing machine is customized developed for the industry, and has also got many patents. Features: new brushless DC motor, speed feedback system, new auto location clamping device for container, high quality one body mixer shaft, monitor sample temperature, timing device for dispersing, and arc bottom container.

展台号 Booth No.: **3.1E27-31**

**邱博工程材料有机手感消光剂、氢氧化铝、  
煅烧氧化铝**  
Huber Engineered Materials offers organic flattening &  
effect agents, ATH, calcined aluminas

邱博工程材料将展出以下产品：Pergopak® 有机手感消光剂 - 有助于工业涂料、油墨和罩印清漆配方设计师在低光泽、流变性、耐磨性、硬币划伤性、防水性、耐化学试剂性、耐热性和柔感等方面获得更均衡的性能，达到硅或蜡等消光剂无法实现的效果。氢氧化铝 (ATH) - 适用于涂料的多功能阻燃剂、抑烟剂和颜料添加剂。Martoxid® 煅烧氧化铝应用于抛光和研磨。

Huber Engineered Materials will be showcasing: Pergopak® organic flattening and effect agents, which help formulators of industrial coatings, inks and overprint varnishes achieve a higher performing balance of low gloss, rheology, abrasion resistance, coin-marking, water resistance, chemical resistance, heat resistance and soft feel, that they are unable to achieve with silica or wax flattening agents. Alumina Trihydrate (ATH), a versatile flame retardant, smoke suppressant and extender



pigment is used in coatings applications. Martoxid® calcined aluminas, for polishing and grinding applications.

展台号 Booth No.: **2.1E68-70**

**帕特纳水性附着力促进剂**  
Suzhou Partner's waterborne  
adhesion promoter

苏州帕特纳环保新材料有限公司将展出水性附着力促进剂，是一种胺类化合物，它在水性涂料中具有较好的安定性和较长的存储期；本产品可与树脂和基材进行双向反应、架桥，从而明显提高水性涂料对玻璃、金属、极性塑料等基材的附着力和涂层的耐水性、耐腐蚀性。

Suzhou Partner Pro-Environment New Material Co., Ltd. will showcase its new waterborne adhesion promoter, which is a kind of amine compound. It is more stable in the waterborne coatings, and can be shelved for a longer period. The product can have two-way reactions and bridging effects with resins and binders, therefore significantly improving the adhesion, water resistance and corrosion resistance of waterborne coatings to substrates, such as glasses, metal and polar plastics.

展台号 Booth No.: **4.1C61-64**

**湛新全系列绿色技术助您的  
涂料市场推陈出新**  
Allnex: green technologies help  
deliver new coating solutions for you

2016 年 9 月，湛新 (Allnex) 与纽佩斯 (Nuplex) 正式合并，全新的湛新公司是涂料树脂和助剂生产商，为建筑、工业、防腐、以及汽车和其它特殊用途的涂料和油墨提供树脂原料。产品范围从创新液态树脂和添加剂、到辐射固化及粉末涂料树脂和交联剂，用于木材、金属、塑料和其它表面。增加使用可持续发展的原材料、提供安全的解决方案、帮助客户优越于不断变化的法规是湛新研发战略的重点和焦点。

In September 2016, Allnex and Nuplex Industries, a global manufacturer of resins, were brought together to form an industrial coating resins company globally. Allnex produces coating resins and additives for architectural, industrial, protective, automotive and special purpose coatings and inks. We offer the broadest portfolio of high quality, innovative liquid resins and additives, radiation cured and powder coating resins, and crosslinkers for use on wood, metal, plastic, and other surfaces. A critical focus of our R&D strategy is to increase the use of sustainable raw material in order to deliver safe solutions to help our customers stay ahead of continually evolving regulations.



展台号 Booth No.: **2.1E15-20**

**青岛扶桑超高纯硅溶胶、有机酸**  
Qingdao FUSO offers ultra-high purity  
colloidal silica and organic acids

扶桑的超高纯硅溶胶，严格控制金属离子量（总金属离子 1ppm 以下）和粒子形状大小，以确保其稳定品质。青岛扶桑推出普通硅溶胶，产品用途甚广，能使涂料牢固，并具抗污防尘、耐老化、防火等功能。

Qingdao FUSO has a strict control of ultra-high purity colloidal silica production, including metal ions volume (total metal ions below 1ppm), particle shape and size, to ensure its stability. Qingdao FUSO launches ordinary colloidal silica which can be used in various industries. They can make the coatings firm, improve its dirt pickup resistance and fire resistance, as well as slow down its physical aging.



展台号 Booth No.: **2.1J05**



**保定市华联化工有限责任公司**

保定市华联化工有限责任公司成立于1997年，是中国专业的建材添加剂生产商，在干砂砂浆添加剂领域中占有重要的一席之地。目前主要从事可再分散乳胶粉的研制、生产、销售及进出口贸易。产品广泛应用于各种结构和非结构的建筑粘合剂、干混砂浆改性、墙体保温及饰面系统、墙体找平胶和密封膏、粉末涂料、建筑腻子等领域。

公司宗旨：科技创新、探索研究、合作共赢、缔造家圆  
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展位号: **4.2B44/46**





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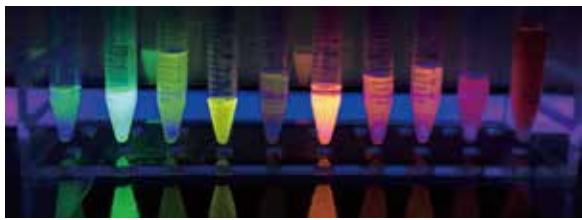
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我们本着“质量第一、服务第一”的经营宗旨，致力于功能性纳米二氧化钛及新材料的研发，各种产品均符合行业的各项规范要求。



展位号：4.2B01-10  
关注有礼（展会期间领取）

## DayGlo Color 日光荧光颜料 DayGlo Color's daylight fluorescent pigments



DayGlo Color 公司专业生产日光荧光颜料，该公司的技术可以改善和增强任何颜色，从微妙的特色效果到夜光颜料，以及在黑光下反应的传统荧光系列。自 30 年代以来，DayGlo 一直服务全球色彩市场。

Day-Glo Color Corp. specializes in manufacturing fluorescent pigments. The company develops technologies that improve and enhance any color, from subtle specialty effects, to glow-in-the-dark pigments, to its classic range of fluorescents that react under black light. DayGlo has served the world's color marketplace since the 1930's.

展台号 Booth No.: 1.1E37-41

## 华一宝纳米棒销式砂磨机 Huayibao's nm bar-pin type sand mill

华一宝的纳米棒销式砂磨机具循环研磨系统，适用于几乎所有的产品，可使用的最小研磨珠直径达到 0.1mm，快速达到最高产量和计入纳米级细度范围，最小细度可达  $D_{97} < 100nm$ 。此外，本机设较短较大直径的研磨腔体，以减少流动惯性力，并有更长更大直径分离系统，同时带强制冷双端面机械密封。另外，更可在管道和物料罐上外加冷却交换系统，能操作一遍或多遍通过式，可达更高产量。

The circulating grinding system of Huayibao's nm bar-pin type sand mill is suitable for almost all products. The sand mill can adopt the minimum grinding bead up to 0.1mm in diameter, and it can quickly reach its highest output within its nanometer range, minimum  $D_{97} < 100nm$ . In addition, it can be equipped with a shorter diameter grinding chamber to reduce the flow inertia force, and a longer diameter separation system with a strong cooling double mechanical seal. A cooling exchange system can be added to the pipeline and the material tank, then just one or more passes can reach higher throughput.

展台号 Booth No.: 3.1E69-70

## 广东派齐水包水多彩原材料 Guangdong PASSION's water-in-water multicolor paint raw materials

广东顺德派齐专业生产水包水多彩原材料和水性涂料原材料，包括 A-628 交联保护剂。A-628 交联保护剂易溶于水，基础漆倒入其水溶液中造粒，可增加粒子的韧性，使粒子耐剪切，不易破碎，主要应用于制备造粒用交联保护剂水溶液。



Guangdong PASSION specializes in manufacturing water-in-water multicolor paint raw materials and waterborne coatings raw materials, which include A-628 cross-linking protectants. A-628 cross-linking protectants are easily soluble in water. The base paint poured into its aqueous solution to granulate, increasing the particle toughness, making the particles resistant to shear, not easily broken. A-628 can be applied for preparing an aqueous solution of a cross-linking protective agent for granulation.

展台号 Booth No.: 1.2F21/23

## 上海惠广纤维素醚 Shanghai Huiguang's cellulose ether

上海惠广专业生产纤维素醚（包括：HPMC、HEMC、MC），产品应用于建筑、粘合剂、涂料等行业。公司采用国外引进大型纤维素醚柔性生产线，包括气固反应整体设备技术和 DCS 自动生成控制系统。HPMC 具增稠作用，保护胶体，帮助颜料悬浮，提高水性涂料的粘度稳定性和溶解性。HPMC 具良好的粘度储存稳定性以及具有优良的分散性，因而 HPMC 特别适用于在乳化涂料中作为分散剂。



Shanghai Huiguang specializes in manufacturing cellulose ether (HPMC, HEMC and MC) which is widely used in industries such as construction, adhesives, coatings, etc. The company adopts a large-scale high-end cellulose ether flexible production line with a gas and solid phase integral equipment reaction technology and uses DCS automatic production and control system. HPMC can act as a thickening agent in coatings, and it can also protect the colloid, improve the pigment suspension and increase viscosity and solubility of the waterborne paint. HPMC has stable viscosity and good dispersibility, therefore acting as a dispersant in emulsions.

展台号 Booth No.: 3.2C65-67



QINGDAO HIGREE CHEMICAL CO., LTD  
20E, Huaren International Building,  
No.2 Shandong Road, Qingdao 266071, China  
TEL: +86 532 68899525  
FAX: +86 532 68899529  
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Higree, has been the global leading supplier of hydrocarbon resin for paint&coatings, adhesives&sealants, inks, and rubber industries

展位号：1.2A47

## 上届观众对展会的评语 What our Past Visitors Said about the Show



“ 展会拥有国际化展商组合和广泛展品类别，为我提供多样的采购选择。

The global mix of exhibitors and wide range of products provided me with a variety of sourcing options.

刘婕妤 小姐 Ms. Jieyu Liu  
工程师，叶氏化工研发（上海）有限公司  
Engineer, Yip's Chemical Research & Development (Shanghai) Co., Ltd.



“ 我很喜欢这个展会，让我做好采购的策略，并寻求新的供应商或合作伙伴。

I like the exhibition where I could prepare for purchasing decision, and sought new suppliers or partners.

胡仕谈 Mr. Stan Hu  
技术总监，新东方油墨有限公司  
Technical Director, New Oriental Ink Co., Ltd.



“ 我来寻找新产品，并借此寻找新材料做产品研发。

I sourced new products and new materials for product development.

苗永志 先生 Mr. Yongzhi Miao  
基材技术部技术经理，立邦涂料（中国）有限公司  
Technical Manager,  
Substrate Technology Department,  
Nippon Paint (China) Co., Ltd.



“ CHINACOAT 是名副其实的国际大展，推动了行业交流及发展。CHINACOAT lives up to its name as the world's coatings show that it promotes the exchange and development of the industry.

Mr. Erik Hartmann 先生  
SCANDICO ApS, 丹麦  
SCANDICO ApS, Denmark



“ 我第一次参观。展商组合国际化，为我提供多样原料化学信息选择。

It's my first time at CHINACOAT. The global mix of exhibitors offered me a variety of sourcing options for raw materials chemicals.

Mr. Rupesh Garg 先生  
董事，Sonolac Paints & Coatings Ltd., 印度  
Director, Sonolac Paints & Coatings Ltd., India



“ 我第三次参观。这次是为了收集采购决定的信息。It's my third time at CHINACOAT. I came here to collect information for making purchasing decisions.

Mr. Esteban Recht 先生  
Nova Productos Quimicos s.a., 阿根廷  
Nova Productos Quimicos s.a., Argentina