CUSTOMIZING TOMORROW’S INNOVATIONS

Styrenic solutions for the electronics industry
TABLE OF CONTENTS

IMAGINE
Unique styrenic properties 02

DISCOVER
Wide-ranging electrical & electronic applications 06

PERFORM
INEOS Styrolution products & services 14

COLLABORATE
Pioneering customized solutions 18

EXPLORE
Statistics, studies, specifications 22
As Chief Design Engineer for a global electronics company, Paolo is always dreaming up unique features to build into the next generation of products. For a new mobile office equipment suite, Paolo was determined to find a good-looking exterior material that offered exceptional thermal resistance. He knew he had hit gold when INEOS Styrolution introduced him to specialty styrenics. He never would have imagined that styrenics themselves could be a disruptive technology.

“What are the unique properties of styrenics that make them so attractive to the electronics sector?”
LIFE IN THE FAST LANE

In the electronics industry, trends in global production and consumption are driving demand for lower weight and lower costs, as well as higher thermal endurance and energy efficiency. Transformations in lifestyle and work dictate ever new changes in usage, while connectivity, convergence, regulation and innovation are relentlessly raising the stakes for everyone.

Meanwhile, increasing wealth has created new consumers, as well as fuelling an affinity for leapfrogging technologies. In nearly every global market the value chain has become vastly more complex. For everything from aesthetics and haptics to the bottom line, the only thing that is certain is change itself.

AFFORDABLE INNOVATION

Styrenics are a family of unique polymers with a broad range of applications – from bike helmets, car trims, and toys to smart phones, refrigerators, and inhalers – making styrenics one of the world’s most important thermoplastics. The balanced performance of such properties as excellent aesthetics and high color consistency makes styrenics attractive to designers and manufacturers at every level. Their superior processing abilities also make changes in design of even complex structures simpler and more cost-effective – one big reason stymeric solutions are being used in ever more electronic applications.

INEOS Styrolution is a worldwide leader in electronic specialty styrenics, with a deep understanding of the industry, its rapid pace, high standards and value chains. As a reliable global supplier, INEOS Styrolution also delivers broad application expertise, a long-term commitment to innovation, and opportunities for product co-development right from day one of a new idea. In addition, INEOS Styrolution dedicates significant resources to the development of electronic solutions for tomorrow, to meet the global challenges of today.

Here are some of the reasons styrenics are becoming the polymers of choice for the electronics industry:

- **HIGH UV RESISTANCE & STABILITY**
- **LOWER PROCESSING COSTS**
- **EXCELLENT WEATHERING RESISTANCE**
- **STREAMLINED PRODUCTION PROCESSES**
- **HIGH DIMENSIONAL STABILITY**
- **VERY GOOD FLOWABILITY**
- **SUPERIOR SURFACE GLOSS**
- **DURABLE COLOR FASTNESS**
- **EXCEPTIONAL EASE OF PROCESSING**
- **HIGH IMPACT STRENGTH**
- **OPTIMAL SCRATCH RESISTANCE**
- **HIGH COLOR CONSISTENCY**
- **AMORPHOUS STRUCTURE**
- **SUPERB CHEMICAL RESISTANCE**
- **EXCELLENT SURFACE APPEARANCE**
- **EXCELLENT ESCR**
- **VERY GOOD INSULATING ATTRIBUTES**
- **LOW MATERIAL DENSITY**
Li Wei is Head of Engineering at a Chinese electronic manufacturing services (EMS) company that is steadily moving up-market. His company tasked him with quickly identifying and obtaining a steady supply of transparent, environmentally friendly and heat-resistant polymer blends for LED-TV backlight panels for export to the USA. Li Wei turned to his most trusted materials partner – INEOS Styrolution – who helped make the product (and Li Wei) look exceptionally good.

“WHY ARE STYRENIC SPECIALTY SOLUTIONS SO ATTRACTION TO CONSUMERS, DESIGNERS AND MANUFACTURERS?”
Styrenics are all around us, whether we realize it or not. For instance, the Light Diffuser Plate (LDP) for your LCD-TV backlight system might be utilizing the high molecular weight, high heat resistance and high mechanical strength of styrenic polymers. Or the transparent glass in your home office scanner may be using an acrylic copolymer for its exceptional clarity and rigidity.

Besides their technical advantages, styrenics help products look better, too. The outstanding aesthetics bring high color and high gloss to any electronic device. And their design and manufacturing flexibility makes styrenics attractive to engineers and designers, as well. That flexibility is also pointing the way toward future electronic applications, such as LED lighting or revolutionary 3D printers.

**LOOKING BETTER IS GETTING EASIER**

Looking.better.is.getting.easier

COMING ATTRACTIONS – STYRENIC APPLICATIONS IN DEVELOPMENT

- LED – INEOS Styrolution R&D is developing highly transparent styrenic plastics that enable thinner, larger and higher resolution flat screens and LED lighting solutions.
- 3D printers
- Power tools
- Mobile computing
- Energy production and storage

STYRENIC APPLICATIONS – CONNECTING THE WORLD

Here are some of the reasons specialty styrenics are becoming the polymers of choice for the electronics industry:

**COMMUNICATION & MOBILE APPLICATIONS**

- Cell phones
- Smart phones
- Tablet computers
- Stationary computers
- GPS devices
- Landline telephones
- Telefax machines
- Antennae & communication systems

**TV & MONITOR APPLICATIONS**

- Light diffuser plates (LDP)
- Light guide panels (LGP)
- Front, middle & rear covers
- Guide stand necks
- Stand bases

**OFFICE EQUIPMENT APPLICATIONS**

- Printer, copier & scanner housing parts
- Paper trays, feeders, separators & exteriors
- Document backing
- Light pipes
- Transparent photo trays
- Printer drum units
- Printer platens
- Ink & toner cartridges

**GENERAL ELECTRONIC APPLICATIONS**

- Electrical installations
- Plugs & switches
- Battery housings
- Payment devices
- House electronics (home safety & communication systems)

**LEISURE APPLICATIONS**

- Game consoles
- Audio & video devices
- E-book readers
- Walkie talkie systems
- E-music instruments
- E-bikes
- Sound systems
INEOS Styrolution is the only global company focused solely on styrenics with a broad product portfolio and proven customized approach to co-development. INEOS Styrolution delivers innovation and professional support with an experienced, personal touch.

GLOBAL REACH
AND PROXIMITY
TO CUSTOMER MARKETS

(1) INEOS Styrolution acts as exclusive distributor for the INEOS ABS plant in Addyston, Ohio.
STYRENIC INNOVATION MAKES THESE ELECTRONICS APPLICATIONS POSSIBLE – AND MANY OTHERS
To improve profit margins, a traditional European electronics firm was planning to move production of its mature-market products to Vietnam. As Head of Procurement, Hans was responsible for determining the locations to which crucial chemical compounds could be reliably delivered. Key Account Managers at INEOS Styrolution customized an affordable solution, enabling production, and a timely promotion for Hans.

“How does INEOS Styrolution facilitate the development and implementation of innovative electronic solutions?”
INNOVATION THAT KEEPS YOU ON TRACK, SERVICE THAT KEEPS YOU ON TIME

INEOS Styrolution invests its success in the success of its customers. To grow customer value, INEOS Styrolution offers exceptional global presence, reliability and sustainability. With innovations ranging from high quality plastic design and durable colors to an expanding array of alternatives to keep customer costs low, INEOS Styrolution R&D offers state-of-the-art materials solutions.

Simply put, INEOS Styrolution provides customers with the broadest styrenic portfolio on the market. Customers can also look forward to the world’s largest single steady supply of cost-efficient, high-quality products and impeccable aesthetics. Whatever the challenge, INEOS Styrolution provides a solution, from cutting-edge customized specialty products for premium branding, to products for generic commodities.

INNOVATIVE PORTFOLIO
INEOS Styrolution specialty solutions include:

- **ABS – acrylonitrile butadiene styrene copolymers**
  - Terluran® – sets worldwide standards for very high gloss, easy processing, high color consistency with low yellow index and a superb balance between flowability and mechanical properties.
  - Novodur® – grades offer superior performance in a well-balanced mix of properties, combining high impact strength, dimensional stability, creep resistance and a good surface appearance with chemical resistance, heat resistance, thermal cycling performance and excellent thermofoiling attributes.
  - Absolac® – offers a well-balanced mix of properties for injection molding, including good impact strength, dimensional stability and heat resistance (available in India).

- **ASA – acrylonitrile styrene acrylate copolymers**
  - Luran® S – is a benchmark styrenic polymer for weather resistance, high UV resistance, excellent environmental stress cracking resistance (ESCR), good impact resistance, excellent chemical resistance and superb color retention.

- **SAN – styrene acrylonitrile copolymers**
  - Luran® – injection grade provides an exceptional combination of high gloss, excellent transparency, good chemical resistance, high stiffness, extraordinary heat resistance and very good dimensional stability.
  - Absolac® – offers a well-balanced property profile ranging from excellent transparency and good chemical resistance to high stiffness and good dimensional stability (available in India).

- **Other styrene-based copolymers**
  - NAS® (SMMA) – is considered the premium choice for ESCR strength, high stiffness, extreme transparency, superior processability, mechanical strength and resistance to alcohol.
  - Terluin® (MBAD) – gives excellent transparency, brilliant gloss, impact resistant, good ESCR, good chemical resistance, easy to process.
  - Zyla® (MBS) – offers superb transparency, impact resistant, superior processing flow; good detergent resistance, competitive cost.
  - Crelan® (MBS) – provides a unique balance of clarity, toughness, low density and ease of processing, in a cost effective dry blend form (not available in all markets).

- **Copolymer blends**
  - Luran® SC (ASA/PC) – delivers very great heat resistance (one flame retardant grade meets UL 94 test standards at V 0, great stiffness, excellent impact strength).
  - Terblend® N (ABS/PA) – combines excellent impact strength and chemical resistance with high melt flow and good acoustic damping.

COMPREHENSIVE RANGE
Styrolution PS is a family of general-purpose transparent polystyrene resins suitable for injection molding or extrusion applications:

- **GPPS** – general purpose polystyrene offers color consistency, excellent transparency and easy processing.

- **HIPS** – high impact polystyrene offers color consistency, good balance between flowability and mechanical properties such as impact and tensile strength, and easy processing.
When she was recruited as Head of Design for a start-up mobile device firm, Alice knew that the future of her job would be contingent on getting a cutting-edge product to market—on time and on budget. Alice envisaged using a material that combined low density with exceptional flowability and high gloss. And she would need it in India. What Alice needed didn’t exist until she contacted INEOS Styrolution. Together, they co-created that material. Two years later, the new device she designed is now a modern legend.

“WHY DO ELECTRONICS MANUFACTURERS PREFER INEOS STYROLUTION TO OTHER STYRENIC SOLUTION PROVIDERS?”
A PIONEER GOES FURTHER WITH A RELIABLE PARTNER

INEOS Styrolution offers global assistance with a personal touch. Whenever specialized innovation is required, INEOS Styrolution works shoulder-to-shoulder with its customers to help them gain a competitive advantage – through best-in-class service, reliable formulations, and customized solutions.

With first-rate technology, leading R&D skills and strong intellectual property and patent positions, INEOS Styrolution is uniquely equipped to ensure that new applications find the right formulation for success. To enable best possible quality and process efficiency, INEOS Styrolution provides testing and technical support in the processing, design and computer simulation phases, as well.

Thanks to its broad experience and processing expertise, INEOS Styrolution is an attractive partner for developing new products, technologies and solutions for electronics customers.

TURNING IDEAS INTO PROFITS

Each new product or application begins with an idea. Together with INEOS Styrolution, customers define how those ideas are transformed into real, innovative and practical items for use in the electronics sector.

TEXTURE
Styrenics are widely appreciated for their attractive aesthetics. From glossy to smooth to easy-grip/no-slip surfaces: the look, feel and safety are all premium.

SHAPE
Tough, flexible, thin, robust: INEOS Styrolution helps customers find the right blend for the size and requirements of their application.

COLOR
Customers can choose from over 2,500 existing pre-tested colors or use the INEOS Styrolution Color Excellence Center (CExC) to customize any color and confirm its performance.

WHY COLLABORATING WITH INEOS STYROLUTION IS DIFFERENT: STEP BY STEP

1. An electronics manufacturer has an idea or faces a challenge and communicates this to INEOS Styrolution.
2. INEOS Styrolution listens, reflects and asks questions to further clarify the requirements.
3. INEOS Styrolution draws on its wide expertise and global presence to present the customer with the optimal mix of existing formulations and promising fields of development.
4. INEOS Styrolution delivers customized products for customer sampling and test evaluation according to specifications.
5. Customer and INEOS Styrolution finalize plans to co-develop the new product/application.
INEOS STYROLUTION AT A GLANCE

INEOS Styrolution is the global leader in styrenics. The company provides products for many everyday applications across a broad range of industries, including healthcare, automotive, electronics, household, construction, toys/sports/leisure, and packaging.

2,000+ APPLICATIONS ACROSS SEVEN INDUSTRIES

No1 GLOBAL LEADER in styrenics

3,500+ EMPLOYEES

85+ YEARS of experience in styrenics

10 COUNTRIES

20 PRODUCTION SITES

6 R&D CENTERS

24 sales offices

LETS COLLABORATE

If you would like further details, need assistance in creating your applications, or are curious to explore new possibilities with styrenics, please contact us!

www.ineos-styrolution.com/industry/electronics.html

LOCAL REPRESENTATIVES

EUROPE, MIDDLE EAST AND AFRICA

INEOS Styrolution Group GmbH
Mainzer Landstrasse 50
60325 Frankfurt am Main
Germany

INSTY.info@ineos.com
+ 49 2133 9309168

AMERICAS

INEOS Styrolution America LLC
4245 Meridian Parkway, Suite 15
Aurora, IL 60504
USA

INSTY.americas@ineos.com
+1 866 890 6354

ASIA-PACIFIC

INEOS Styrolution APAC Pte Ltd
111 Somerset Road, #14-16 to 21
TripleOne Somerset
Singapore 238164

INSTY.asia@ineos.com
+65 2 6322 7773

INEOS STYROLUTION SERVES THE ELECTRONICS INDUSTRY AROUND THE WORLD WITH THE LARGEST PORTFOLIO OF STYRENICS, POWERED BY CUTTING-EDGE INNOVATION.
PLEASE NOTE

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. (May 2016)

If you would like more details, please contact a INEOS Styrolution representative who will gladly provide you with any information you require.

Please also refer to INEOS-STYROLUtion.com