



GLOBAL COVERAGE

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SCS Develops New Halogen-Free Parylene Coating

As a pioneer and market leader in Parylene conformal coatings, SCS has been a key innovator in the coatings industry, developing products and technologies such as Parylene HT[®], Parylene C-UVF[®], the AdPro family of adhesion technologies and microRESIST[®] Antimicrobial Parylene Technology. During CES[®], held recently in Las Vegas, Nevada, SCS announced the release of its latest product – ParyFree[®], a halogen-free variant of Parylene. ParyFree conformal coating offers manufacturers the same host of beneficial properties they have come to expect from the Parylene family but with improved barrier properties over traditional halogen-free variants.



Halogens are the elements in Group VIIA of the Periodic Table and include fluorine, bromine, iodine and astatine. Although there are many non-hazardous uses of these elements, in the early development

of printed circuit boards (PCBs), there were numerous toxic compounds used during the manufacturing process. This problem was exacerbated by the improper disposal and incineration of outdated electronics.

In recent years, non-government organizations (NGOs) have voiced environmental concerns and began working with the electronics industry to eliminate halogens from their products. The International Electromechanical Commission (IEC) also passed a regulation for the end-of-life disposal of devices that contained these chemicals. This international directive defines halogen-free at <900 ppm for chlorine, <900 ppm for bromine and <1500 ppm total level of both combined. Due to the pressure applied by NGOs and the guidance set forth by the IEC, many

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CES[®] 2019 Highlights

In January, SCS made its debut at CES[®] in Las Vegas, Nevada. A trusted supplier to some of the world's leading consumer electronics companies, SCS exhibited in the Design & Source Showcase with designers, contract manufacturers and service providers from around the world. Like other industry leaders at the show, SCS introduced a new innovation – ParyFree[®].

Billed as “the world’s gathering place for all those who thrive on the business of consumer technologies”, CES has been the proving ground for innovators and breakthrough technologies for over 50 years – the global stage where next-generation innovations are introduced to the world. The 2019 show did not disappoint those who attended to see, hear and touch the latest technologies in the world of electronics. Over 188,000 people from more than 155 countries visited the show, which was held January 8-11 and spanned 2.75 million square feet of exhibition space at the Las Vegas Convention Center.

CES is owned and produced by the Consumer Technology Association[™] (CTA) and has attracted the world’s top business leaders and pioneering thinkers since the first CES took place in 1967.



Photo courtesy of Consumer Technology Association

Since then, thousands of products have been announced at the annual show, including the Videocassette Recorder (VCR), High-Definition Television (HDTV), Wearable Technologies, Unmanned Systems and many other transformative technologies.

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SPECIALTY COATING SYSTEMS[®]

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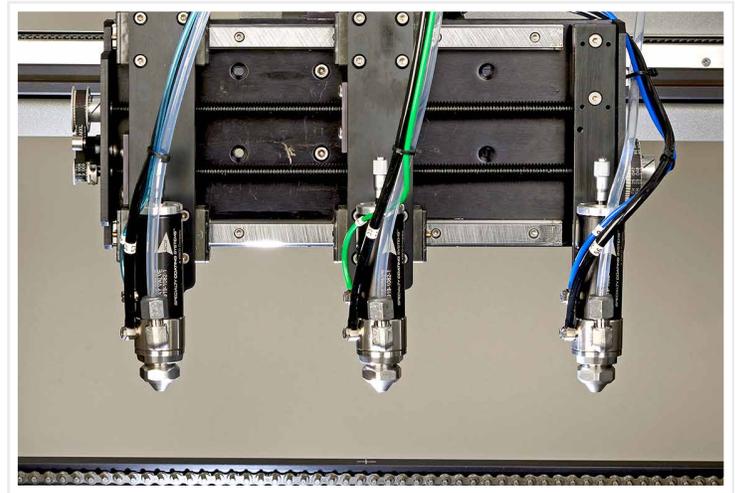
SCS' PrecisionCoat Programmable Valve Spacing: Enhancing Productivity and Accuracy

SCS designs and manufactures automated conformal coating equipment that incorporates over 45 years of engineering expertise and application experience. As an industry leader, SCS continues to develop coating solutions that are highly reliable and focused on improving accuracy, repeatability, efficiency and productivity. SCS' new PrecisionCoat Programmable Valve Spacing feature is a step forward in multi-board array automation. Programmable Valve Spacing saves time, eliminates errors and provides continuous, uninterrupted coating.

The Programmable Valve Spacing feature is available in a two or three valve configuration and alleviates the downtime and inaccuracies associated with manually setting up valve spacing. Instead of loosening, moving and tightening valves along the head assembly for different multi-board arrays, Programmable Valve Spacing uses a lead screw that quickly and precisely adjusts the position of the valves along the head assembly.

The PrecisionCoat's proprietary Windows®-based software makes increasing and decreasing the space between valves for any multi-board array fast, easy and exact. Once valve spacing is established for an array, it becomes part of the coating profile and values are stored when the profile is saved. When the coating profile is used again, the valve spacing values will be loaded, and the valves will adjust automatically.

To further automate the coating process, Programmable Valve Spacing can be combined with other optional features including a barcode reader, conveyor auto-width and programmable atomization pressure. When the PrecisionCoat scans a barcode on a multi-board array,



for example, the software will automatically load the correct multi-board array profile, adjust the conveyor to the correct width, set the atomization pressure and position the valves to the spacing saved in the coating profile.

The PrecisionCoat Programmable Valve Spacing feature provides manufacturers with a solution that more efficiently and accurately coats multi-board arrays. To receive more information on the PrecisionCoat or Programmable Valve Spacing feature, or to request a quotation, contact Hans Bok at 508.997.4136 or hbok@scscoatings.com.

Parylene's Role in Pain Management Technology

Advances in science and medicine have resulted in treatments to improve pain management for patients receiving medical care. The use of nerve location technology, for example, has become more common due to the accuracy that can be achieved during medical treatments and procedures. In the case of spinal surgery, the nerves must be effectively located so they can be avoided during the insertion of the surgical implements that are used to repair the spine. In contrast, nerve block procedures involve locating the targeted nerve(s) to effectively deliver treatment to alter nerve response. A snapshot of these technologies is helpful for understanding the role Parylene plays in pain management technology.

The more common of the nerve location technologies involves the use of a nerve block, which is the administration of anesthetics in close proximity to specific nerves in order to render them less sensitive, dramatically reducing the patient's pain. One form of nerve block, known as therapeutic nerve block treatment, is used to temporarily eliminate or reduce severe or acute pain. It can also be used to diagnose sources of chronic pain so that permanent treatment can be designed and implemented. A second form of nerve block procedure can be used as a pre-emptive measure to avoid the certain pain of an impending procedure; common examples include epidural treatments and those designed to eliminate phantom limb pain after amputations.



To effectively deliver treatment to a specific nerve during a nerve block procedure, it is critical that the location of the target nerve is precisely defined so that a focused treatment can maximize its potency. In addition to the traditional use of ultrasound-guided needle delivery, there is a newer technology that utilizes electrical stimulation to identify nerve location. It is known that the delivery of a low-intensity, short-duration electrical signal will result in defined responses from nerves. In some cases, the response sought is a specific muscle twitch; in others, it is a particular

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SCS Exhibits at IPC APEX EXPO

SCS recently exhibited at the 2019 IPC APEX Expo at the San Diego Convention Center in California. At the show, SCS provided live demonstrations of the PrecisionCoat V with its new Programmable Valve Spacing feature, which saves time and reduces errors by eliminating the need to manually adjust valve spacing when changing profiles, and the highly flexible Automatic Quick Change (AQC) feature that allows for the use of multiple tools within a single machine/coating profile. The PrecisionCoat V's robust features demonstrate that it provides more than a dependable layer of protection; it is a total system solution that ensures accuracy, repeatability and high throughput for a wide range of automated material application.

The new Programmable Valve Spacing feature offers enhanced productivity by eliminating the time and inaccuracy associated with having to stop production and reposition the valves for different multi-board arrays. Once valves are positioned, the valve spacing is stored in the coating profile. This option is available in either a two or a three valve configuration.

The PrecisionCoat's AQC feature allows the use of five separate tools within a single machine. In standard systems, using multiple valves on the same machine limits head travel, which reduces the overall work envelop of the system. In contrast, the AQC feature allows customers to use up to five valves or heads, individually positioned with independent materials and functionality. This industry-leading feature enables users to automate and control the application of multiple materials, including cure functionality, and how each integrate with one another within a single coating profile.

SCS also showcased the PrecisionCoat BT, a unit designed for companies looking to automate their time-intensive manual coating and dispensing processes or those who would like to have additional

coating capacity in their laboratory or production floor. The PrecisionCoat BT improves accuracy, productivity and efficiency in a highly reliable, compact unit.

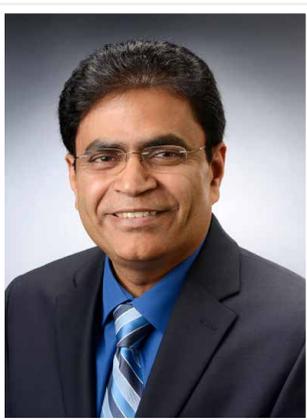
Furthermore, SCS is pleased to announce that it awarded **Lynxtron, Inc. '2018 Representative of the Year'** during APEX for its outstanding performance. Lynxtron has been representing SCS since 2011 in the states of Illinois, Indiana and Wisconsin, selling spray/dispense systems, cure ovens, dip coaters and ionic test systems.

Lynxtron's President, Edward A. Richards, has more than 25 years of experience in sales, marketing and management for several corporations that supply both equipment and materials to the electronics industry. His partner, John R. Murphy, also possesses more than 20 years of experience in design engineering, application management, technical sales and account management. According to SCS Equipment Sales Manager Hans Bok, Lynxtron earned this distinguished award as a result of their knowledge of SCS' systems, their commitment to meeting customers' needs and overall performance.

To learn more about the PrecisionCoat V or PrecisionCoat BT, please contact Hans Bok at 508.997.4136 or hbok@scscoatings.com.



SCS Presents at iMAPS Conference



*Dr. Rakesh Kumar,
Vice President of Technology*

SCS participated as a premier sponsor in the 2019 Advanced Technology Packaging for Medical Electronics Workshop, organized by the International Microelectronics Assembly and Packaging Society (iMAPS). The conference and workshop were held January 22-23 in San Diego, California. Vice President of Technology Dr. Rakesh Kumar presented "Parylene Technology for Advanced Packaging and Protection of Medical Microelectronics" during one of the sessions that highlighted implantable devices.

During the presentation, Dr. Kumar described the key role Parylene plays in implant technologies that sense or facilitate physiological responses within the body. Some examples included pacemakers and

implantable cardiac defibrillators, ingestible sensors, transmitters and radiation dosimeters, neurostimulation devices, RFID implant technologies, hearing aids and x-ray imaging technologies. Dr. Kumar explained, "As the challenges of making these implants safe and effective increase, and their use becomes more widespread, a critical need exists for protective measures to improve reliability and to protect the devices with safe, biocompatible properties." The constant trend toward miniaturization and the ever-increasing longevity requirements of implant technologies provide additional reasons to consider the unique deposition process and unmatched conformal nature of the Parylenes to meet the life-critical requirements of devices.

Dr. Kumar's presentation concluded with recent Parylene advances, including adhesion technologies that have been developed to address various materials used in the medical industry, specifically in medical electronics. To learn more about Parylene conformal coatings and the resources SCS offers its customers, contact Dick Molin at 317.244.1200, ext. 0271, or dmolin@scscoatings.com.

SCS Introduces 'RISE' to China Facilities

As SCS' global presence has expanded over the years, we have remained dedicated to ensuring all of our employees embrace the culture and values that embody the company. Recently, SCS' executive team, including President and CEO Terry Bush, traveled to China to introduce SCS' Core Values to our Shanghai and Shenzhen facilities.

SCS' four Core Values - Respect, Integrity, Service and Excellence (RISE) - serve as a compass for how we interact as colleagues as well as with our customers, vendors and communities.

'RISE' serves as a vital foundation to align employees to the same philosophies and standards when working with each other and our customers. SCS was established on these values and will build on them in the future as we continue to provide the highest level of quality and service to all customers around the globe.

SCS' parent company, KISCO Ltd., opened coating operations in Shenzhen and Shanghai in 2006 and 2010, respectively. Over the past three years, the coating facilities have become part of SCS' global network of Parylene coating operations. Both facilities are ISO 9001 certified and provide Parylene conformal coating services to customers in the electronics, transportation, medical device and aerospace industries.

To learn more about Parylene conformal coatings or any of SCS' coating facilities around the world, visit scscoatings.com/locations.



Respect: Showing consideration and appreciation for others and their contributions, points of view, talents and uniqueness.

Integrity: Upholding the highest ethical standards by being truthful, responsible and accountable for all activities and commitments undertaken.

Service: Considering our customers, both internal and external, in every decision, transaction and communication.

Excellence: Continuously striving to achieve the highest personal and professional standards in all that we do.

CES® 2019 Highlights (continued)

The 2019 show featured thousands of new product introductions in various product categories and 25 different 'Marketplaces' that focused on Health & Wellness, iProducts, Self-Driving Technology, Smart Home and many more. Many of the world's leading innovators such as LG Electronics, Samsung, Amazon and Google launched their latest products and technologies.

Each year, CES celebrates outstanding product design and engineering in brand-new consumer technology products with Innovation Awards. The Innovation Award program recognizes honorees in 28 categories. Recipients of this year's award included Sony, Bosch and Veniam, GE and KOHLER, to name a few.

In addition to the various products and technologies that were showcased by exhibitors, CES 2019 also featured over 1,000 industry

experts who presented a wide range of topics, including 5G technology, the Internet of Things (IoT), Health & Wellness, Robotics & Machine Intelligence, as well as several others. The keynote speakers included leaders from some of the world's largest manufacturers such as the President and Chief Technology Officer of LG Electronics, Dr. I.P. Park, who discussed the artificial intelligence (AI) landscape and its impact on the lives of consumers in the coming years.

CES was a success for SCS and many other exhibitors. As worldwide industry requirements and directives continue to evolve, SCS will be at the forefront with products like ParyFree. To learn more about how ParyFree can safeguard your electronic devices, contact Alan Hardy at 317.244.1200, ext. 0261, or ahardy@scscoatings.com.

Parylene's Role in Pain Management Technology (continued)

sensation and intensity in a precise location identified by the patient who remains conscious during the procedure. To deliver this stimulus in a precise manner, an insulated needle with an exposed tip is inserted so that its tip is near the target area. A search is initiated whereby the needle is moved, ever so slightly, while intermittent stimuli are delivered. When the appropriate response occurs, the optimum location has been identified and the injection of local anesthetic is made. This not only ensures the delivery is accurately made, but it also minimizes the risk of nerve injury.

Parylene is often used in these pain management technologies as the coating provides a reliable, electrically-insulating barrier. Due to its

dielectric properties, Parylene's role as an insulator on the length of the needle is of vital importance, and its performance allows the procedure to be conducted in a safe and reliable fashion. Parylene's deposition physics are also important, as the ultra-thin coating is applied in an exceptionally uniform fashion, enabling needles to move smoothly into and through the body.

For further information on how SCS Parylenes can benefit medical applications, contact Dick Molin at 317.244.1200, ext. 0271, or dmolin@scscoatings.com.

SCS Develops New Halogen-Free Parylene Coating (continued)

consumer electronics companies have committed to eliminating halogens from their products. With a notable history of anticipating and responding to industry trends and regulations, SCS developed ParyFree – a halogen-free Parylene coating that offers superior barrier properties over traditional non-halogen variants.

Like other commercially-available Parylenes, SCS ParyFree is applied through a vapor deposition process that results in an ultra-thin, uniform, pinhole-free conformal coating. The thin film forms at a molecular level to fully encapsulate components and devices, offering complete protection and increased reliability of intricate, complex electronic devices. To verify its efficacy as a halogen-free material, ParyFree coatings were tested in accordance with BS EN 14582:2007 at an independent testing facility. The results showed that there are no detectable levels of chlorine, bromine, fluorine or iodine in ParyFree coatings, validating the coating’s use in halogen-free applications.

ParyFree-coated electronics have also been tested in accordance with the applicable requirements of IEC 60529, test conditions 14.2.7 and 14.2.8 for IPX7 and IPX8 designations, which demonstrates protection from harmful effects due to the ingress of water. The uncoated (control) electronics functionally failed during the test, but all ParyFree-coated electronics passed both test conditions, functioning normally both during and after testing. These tests demonstrate that ParyFree conformal coating is suitable to protect electronics and other devices against water splash and water immersion for more than 30 minutes at a depth of 1 m (IPX7) and 1.5 m (IPX8).

To learn more about ParyFree conformal coating and how it can add value to your application, contact Alan Hardy at 317.244.1200, ext. 0261, or ahardy@scscoatings.com.

SCS PARYLENE PROPERTIES

	Method	Parylene N	ParyFree	Parylene C	Parylene HT	Acrylic (AR) ^{ab}	Epoxy (ER) ^{ab}	Polyurethane (UR) ^{ab}	Silicone (SR) ^{ab}
Dielectric Strength V/mil	1	7,000	6,900	5,600	5,400	3,500	2,200	3,500	2,000
Dielectric Constant	60Hz	2.65	.38	3.15	2.21	-	3.3 - 4.6	4.1	3.1 - 4.2
	1KHz	2.65	2.37	3.10	2.20	-	-	-	-
	1MHz	2.65	2.35	2.95	2.17	2.7 - 3.2	3.1 - 4.2	3.8 - 4.4	3.1 - 4.0
Dissipation Factor	60Hz	0.0002	0.00001	0.020	<0.0002	0.04 - 0.06	0.008 - 0.011	0.038 - 0.039	0.011 - 0.02
	1KHz	0.0002	0.0009	0.019	0.0020	-	-	-	-
	1MHz	0.0006	0.0007	0.013	0.0010	0.02 - 0.03	0.004 - 0.006	0.068 - 0.074	0.003 - 0.006
Water Vapor Transmission Rate (g•mm)/(m ² •day)	3, 4, 5, 6	0.59	0.09	0.08	0.22	13.9	0.94	0.93 - 3.4	1.7 - 47.5
Water Absorption (% after 24 hours)	7	<0.1	<0.1	<0.1	<0.01	0.3	0.05 - 0.10	0.6 - 0.8	0.1
Service Temperature	Continuous	60°C	60°C	80°C	350°C	82°C	177°C	121°C	260°C
	Short-Term	80°C	80°C	100°C	450°C	-	-	-	-
UV Stability	9	≤100 hrs	≤100 hrs	≤100 hrs	≥2,000 hrs	-	-	-	-
Coefficient of Friction	Static	0.25	0.23	0.29	0.15	-	-	-	-
	Dynamic	0.25	0.23	0.29	0.13	-	-	-	-
Tensile Strength (psi)	11	7,000	9,600	10,000	7,500	7,000 - 11,000	4,000 - 13,000	175 - 10,000	350 - 1,000
Penetration Ability ^d		40 x dia.	10 x dia.	5 x dia.	50 x dia.	Spray or Brush	Spray or Brush	Spray or Brush	Spray or Brush
Rockwell Hardness	12	R85	R136	R80	R122	M68 - M105	M80 - M110	68A - 80D (Shore)	40A - 45 A (Shore)
USP Class VI Polymer		Yes	Not Yet Available	Yes	Yes	Varies	Varies	Varies	Varies
Biocompatibility ^e		ISO 10993	Not Yet Available	ISO 10993	ISO 10993	Varies	Varies	Varies	Varies

Personnel Highlights



As the plant manager for SCS’ New Hampshire coating facility, **Chase Markey** is responsible for managing the daily operations of the site.

Chase joined SCS in 2010 as a production engineer in Indianapolis, Indiana, and later transitioned into the role of operational excellence leader before moving to Amherst, New Hampshire, in 2017.

Prior to joining SCS, Chase worked as an engineer and production manager for an aluminum recycling company. Chase attended Purdue University where he earned a bachelor’s degree in industrial engineering.

In his spare time, Chase enjoys playing the drums, bowling, golfing and reading.

Personnel Highlights



Cheong Sun Kwan joined SCS in the fall of 2018 as the Director of Sales, China and Thailand, bringing over 20 years of sales experience in the electronics industry. He attended Shibaura Institute of Technology in Tokyo, Japan, where he majored in industrial management.

In his role, Cheong provides oversight to the China and Thailand sales teams and leads the development and implementation of regional sales strategies, objectives and initiatives.

Cheong is married with two children. He enjoys reading and walking trails.

Upcoming SCS Trade Shows

- March 18 - 20, 2019 | Medtec Japan | Tokyo, Japan
- March 19 - 22, 2019 | AMPER | Brno, Czech Republic
- March 27 - 28, 2019 | Medlab Asia Pacific | Singapore
- April 3 - 4, 2019 | SMTA Electronics in Harsh Environments | Amsterdam, Netherlands
- April 3 - 4, 2019 | ENOVA Nantes | Nantes, France
- April 16 - 18, 2019 | SPIE Defense + Commercial Sensing | Baltimore, Maryland
- April 24 - 26, 2019 | NEPCON China / SMTA China East Conference | Shanghai, China
- April 30 - May 2, 2019 | AUVSI XPONENTIAL | Chicago, Illinois
- May 6 - 9, 2019 | OTC Houston | Houston, Texas
- May 7 - 9, 2019 | Semicon Southeast Asia | Kuala Lumpur, Malaysia
- May 14 - 17, 2019 | China International Medical Equipment Fair (CMEF) | Shanghai, China
- May 15 - 16, 2019 | BIOMEDevice | Boston, Massachusetts
- May 15 - 16, 2019 | Med-Tech Innovation | Birmingham, United Kingdom
- May 20 - 22, 2019 | Space Tech Expo USA | Pasadena, California
- May 21 - 23, 2019 | MedtecLIVE | Nürnberg, Germany

For more information and booth numbers, visit scscoatings.com/shows.

Connect with SCS



Specialty Coating Systems welcomes you to connect with us on social media. Be one of the first to explore new advances in Parylene technology, upcoming educational opportunities, trade show appearances and much more! Find us on Facebook, LinkedIn and Twitter.

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Regional Coating Sites

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*The **Global Coverage** exists to promote a better understanding of Parylene and the capabilities of Specialty Coating Systems. For previous issues, visit scscoatings.com.*

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