

**Feature Value Creation by the ADEKA Group**

Received the Publicity Prize from the Public Relations Committee of the Society of Polymer Science, Japan at the 27th Polymer Materials Forum in November 2018

**Chemicals**  
**Electronics and IT Materials**  
 Friendly to People and the Environment  
**Organic Solvent-Free Water-Soluble Ultraviolet Curing Material**

Applications	Advantages
<ul style="list-style-type: none"> <li>● Printing inks, coating agents</li> <li>● Containers and packaging materials</li> <li>● Photoresist</li> </ul>	<ul style="list-style-type: none"> <li>● Uses no organic solvents, so it is friendly to people and the environment</li> <li>● Highly water soluble and superior oxygen barrier</li> <li>● Patterning can be performed with only water</li> <li>● Can be hardened using LED light source</li> </ul>

Volatile organic compounds (VOCs) have a harmful effect on the human body and the environment, and their use is being increasingly regulated around the world. ADEKA has developed a water-soluble ultraviolet (UV) curing material that employs a proprietary water-soluble molecular structure to eliminate the use of organic solvents. By leveraging ADEKA's organic synthesis and UV curing technologies, the product realizes high water resistance that is difficult to achieve with conventional water-soluble materials. Patterning can be achieved using only water.

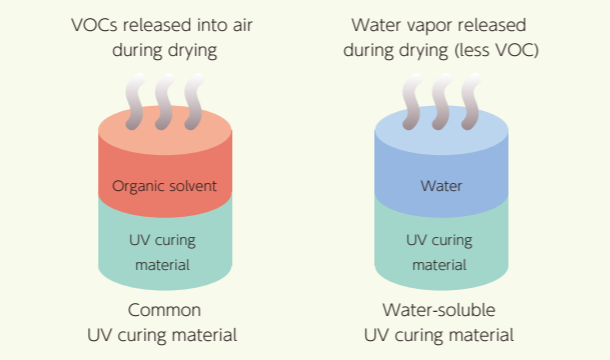
ADEKA is committed to reducing the burden on people and the



Patterning on plastic using ink containing water-soluble UV curing material

environment through the development of products that meet the needs of diverse applications such as for use in printing inks, coating agents, electronics materials, and displays.

**Features of Water-Soluble UV Curing Material**



**New Businesses**  
**Energy**  
 Addressing Resource Depletion

**Sulfurized Polyacrylonitrile (SPAN) Rare-Metal-Free Active Material**

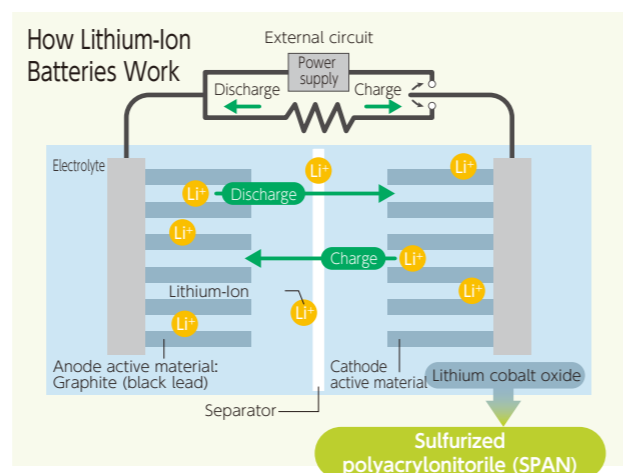
Applications	Advantages
<ul style="list-style-type: none"> <li>● Lithium-ion rechargeable batteries</li> <li>● Next-generation rechargeable batteries</li> </ul>	<ul style="list-style-type: none"> <li>● Rare metal-free</li> <li>● Lighter, safer, and longer-lasting batteries</li> </ul>

Due to the high energy densities, light weight and compact size, lithium-ion rechargeable batteries are used in a variety of electrical products. Continued development is anticipated to further establish lithium-ion batteries as a key technology for realizing a low-carbon society, in applications such as large energy storage systems for renewable energy and as a power source to drive electric vehicles (EVs).

The electrodes on lithium-ion batteries are made from rare metals such as cobalt that are at risk of depletion and vulnerable to price increases. While R&D is being conducted around the world to develop alternative materials, no such materials have reached the stage of practical application. ADEKA is studying the mass production of sulfurized polyacrylonitrile (SPAN),\*1 a product of the reaction of polyacrylonitrile (PAN) with sulfur, and has begun to supply evaluation samples.



Rare metal-free active material SPAN

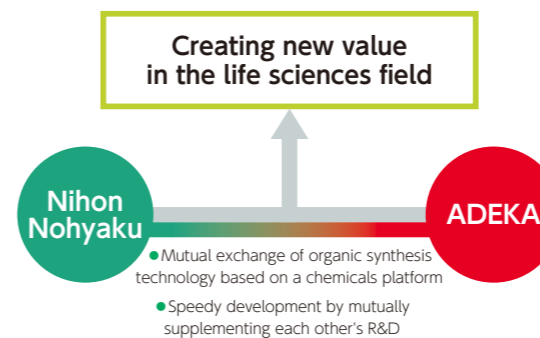


\*1. Manufacturing SPAN generates a large amount of hydrogen sulfide, making it difficult to mass produce SPAN. ADEKA is further studying mass production of SPAN using its technology and know-how for processing hydrogen sulfide, and methods developed by the National Institute of Advanced Industrial Science and Technology and Toyota Industries Corporation.

**New Businesses**  
**life sciences**  
 ADEKA Group Acquires Nihon Nohyaku

**Leveraging Synergies to Create New Value**

In 1928, the agricultural chemical business of ADEKA and Fujii Seiyaku Co., Ltd. merged to form Nihon Nohyaku Co., Ltd., Japan's first agrochemical manufacturing company. Under its corporate principle of "Contributing to society by ensuring a safe and steady food supply and improving the quality of life for all," Nihon Nohyaku has widely supplied agrochemicals, realized advancements in pest control technology, and promoted the safe and appropriate use of agrochemicals. Nihon Nohyaku has currently expanded into chemicals, pharmaceuticals, and animal health care, with agrochemical manufacturing and sales as its core business. The addition of the agrochemicals business to the ADEKA Group's business portfolio will accelerate the Group's business development in the life sciences field.



**Creating Highly Safe, Selective, and Original Agrochemicals**

Nihon Nohyaku has direct sales networks in countries in North America and Europe, as well as in other major agricultural producers including Brazil, India, Taiwan, Vietnam, and Colombia. Overseas sales now accounts for more than 50% of its consolidated net sales.

Nihon Nohyaku believes that safe agrochemicals provide selective efficacy on targeted pests with low toxicity and volume. For example, Nihon Nohyaku's insecticide APPLAUD (buprofezin) has a killing effect against plant hoppers, which are rice paddy pests, and whiteflies and scale insects that harm cotton and fruits. However, it does not affect their natural predators such as birds, frogs, and spiders. Nihon Nohyaku has created such highly safe, selective, and original agrochemicals, enabling it to establish a unique position in the agrochemical market.

**Launching New Agrochemicals Every Three Years to Contribute to the Stable Supply of Food**

Nihon Nohyaku has an ongoing goal of launching new agrochemicals every three years. The company strives to achieve this goal by employing all-around screening\*1 to ensure that valuable compound efficacies are not overlooked in drug discovery research. In addition, Nihon Nohyaku is actively pursuing exchanges with external organizations, such as pursuing open innovation with universities and public research institutions.

The global population is projected to rise to 9.7 billion people by 2050. The need for new agrochemicals is increasing in an effort to secure sustainable food production and quality. However, only the major U.S. and European multinational corporations and a few Japanese companies can develop new agrochemicals, which require advanced synthesis and screening technology together with extensive expertise. Nihon Nohyaku is generating international interest in its advanced agrochemical development capabilities.

**TOPICS >>**

**Product Development and Technical Sales Working Together to Solve the Issues of U.S. Customers**

Nichino America, Inc. was founded in 2001 for the sales and support of Nihon Nohyaku's products in the U.S., which is a major agricultural producer and the world's largest crop exporting country. Technical sales representatives identify issues with existing disease protection through their discussions with customers and provide customized protection programs, thereby building trust with customers.

Peanut farmers in the state of Georgia have struggled for many years with soil-borne white mold, which has led to significantly reduced crop yields. Nichino America's product development team collaborated with the University of Georgia to conduct numerous field trials that established the efficacy of Convoy as a fungicide for white mold. The company made a proposal to a major peanut farmer in the state of Georgia to apply Convoy twice at 30-day intervals, and this successfully stabilized crop yields.



\*1. All-around screening: A method in which one compound goes through an evaluation process that covers a wide range of fields including insecticide, fungicide, and herbicide.