



JQR  
Select Japanese Skills

Top Share of the World Market for  
Nonradioactive Luminescent Paint  
**Ensuring Safety  
in the Dark LumiNova®**

Photography/ Susumu Nagao Interview and text/ Kyoko Ohtsu



Takashi Matsuzawa,  
President of Nemoto & Co.,  
Ltd. A core member of the  
team that developed  
LumiNova and saved the  
company from crisis.

**Imagine if everything around you suddenly went dark. That's exactly what happened on March 11, 2011 during the sudden blackouts after the disasters in eastern Japan, and again with the rolling blackouts that were implemented afterwards. People passed the time huddled together with only tiny lights to depend on, calling out to one another in the dark.**

Chemical company Nemoto & Co., Ltd. developed a special phosphorescent pigment that continues shining brightly, even during blackouts, and quietly helps to maintain safety everywhere in the world. The emergency exit signs you see in subway stations, for example, all use Nemoto's phosphorescent pigment LumiNova. The world market for luminous clock faces is another area that Nemoto dominates with its luminous pigment.

"We originally developed it for use on clock faces, but needs have changed with the times. Nowadays it is

increasingly being used in safety fields," said President Matsuzawa.

The crowds of people using the stairs to evacuate from the World Trade Center during the September 11, 2001 terrorist attacks in New York are still fresh in the memories of many. After the attacks the media reported a comment made by one of the evacuees, who said that bits of old luminous tape left on the stairs had been very useful. As a result the necessity of luminous tape and evacuation guidance signs was reevaluated, and soon after that an ordinance was passed in New York making it compulsory for industrial facilities over 75 feet high (approximately 23 meters) to establish luminous guidance systems in evacuation passageways.

Airplanes also have soft glowing green marks on the floor in the aisles that are visible when it becomes dark. These luminous marks do not obstruct the

movement of passengers or food trolleys, require no wiring or electricity and never break down. Ever since they were first introduced by Lufthansa in 1996, they have been used in many aircraft.

After the fire that occurred in the Mont Blanc Tunnel in the Alps in 1999, LumiNova evacuation guidance signs were installed at regular intervals in tunnels in Switzerland.

"LumiNova can be used effectively to prevent disaster," explains President Matsuzawa. "For example, if a series of adverse conditions occurs all at once—like power going down on a cloudy day, and traffic lights and street lighting going out at the same time—it can get quite dark, even outside. Recently we've had a lot of requests coming in from local governments, who want to make signs for evacuation center buildings and evacuation routes in case of tsunami."

TAKUMI

JQR Select Japanese Skills



The powdered raw material for LumiNova is mixed and fired. This block is shipped in powdered form as the final product.



Clock faces are the oldest and best known application for luminous paint. Even today Nemoto's LumiNova is used on clock faces around the world.



Guidance signs indicating emergency exits and evacuation routes, used to be illuminated internally by light bulbs. LumiNova, however, is even more ecologically sound than LED lighting because it requires no wiring or electrical work.

## Safety and Security Products to Protect the World



The value of glow-in-the-dark evacuation guidance displays in case of accident or disaster has been emphatically proven. Demand looks set to increase in the future.



A fire truck hose coated with LumiNova. The Tokyo Fire Department introduced this hose so that firefighters can find their way out in case of a blackout while they are fighting fires.



Nemoto's sensor products are widely used by businesses and in private homes. These include catalytic type gas sensors (the three sensors on the left), ionization smoke sensors (the two sensors at the rear) and electrochemical gas sensors (the six sensors on the right).

### Luminous Paint Containing no Radioactive Substances

As a luminous paint containing no radioactive substances, LumiNova is unrivalled throughout the world. Before it was developed in 1993, luminous paint that didn't contain any radioactive material wasn't being used anywhere in the world. Luminous paint back then was self-luminescent, utilizing the energy from radium to create a glow, and up until the Second World War, it was mainly used by the military. The dials and needle tips of instruments in airplanes and submarines were painted so that they could be used for fighting even at night. In fact, Nemoto was founded during the war.

After the war, military requirements were replaced by demand from private businesses, and luminous paint was used for clock faces. With both the technology and raw materials at its disposal, Nemoto set about developing a new luminous paint that was less dangerous than radium by purifying the nuclide promethium. Because

promethium emits extremely weak radiation that travels only about thirty centimeters through the air, any radiation could be completely blocked with a glass cover. The enhanced safety of this luminous paint earned Nemoto the trust of major clock manufacturers, with the company growing so much it gained a monopoly on the market.

Then came the 1990s, an age in which environmental issues became a far greater concern, and Nemoto's clock manufacturing clients made a ringing declaration in newspapers that they would completely stop using luminous paint containing radioactive substances within five years. The company was thrown into panic when it learned of this declaration. In order to survive, they had no choice but to develop a new material that was completely free of radioactive substances.

Nemoto embarked on a series of experiments, testing different raw materials, changing the compositions, and adjusting the manufacturing

conditions in approximately 3,000 combinations. It took three years, but eventually the hopes of everyone in the company were realized when LumiNova was born.

The fact that it contains no radioactive substances is not the only superior quality of LumiNova. It is also dramatically more efficient than previous paints, being ten times brighter and emitting luminescence for ten times longer. And because it has the ability to repeatedly absorb light and emit luminescence, it can be used



LumiNova is produced at the Pombal Plant in Portugal. From raw material preparation to final product, the production line is almost entirely automated.

semi-permanently. Another improved aspect is that it is highly heat resistant due to being fired for a long time at temperatures of 1350-1400°C.

Clockmakers switched wholesale to LumiNova around 1995, and it is used without exception in all clocks made in Japan. Meanwhile, a joint venture company established in Switzerland began manufacturing LumiNova and selling it to old established watch makers such as Rolex. Before long LumiNova was accepted in Europe and has been used in almost all timepieces made there since 2000.

LumiNova is also unrivalled from an ecological perspective. Internally lit emergency exit displays are now being replaced with glow-in-the-dark type displays throughout the USA. If all electric displays in America were replaced, it is estimated that there would be a reduction of electricity consumption equivalent to the power output of three nuclear reactors.

Other manufacturers besides

clockmakers have found this safe and secure luminous pigment to be useful, with LumiNova being put to use in a wide and sometimes unexpected range of products, such as fishing lures and buttons for remote controls. Depending on where it is used, it can be more ecologically sound and economical than LED lighting.

### Making the Most of Core Technologies

Nemoto proceeded to diversify into other fields, with ventures in phosphorescent materials, special fluorescent materials and sensors in the safety and security fields, as well as life sciences ventures supporting the development of medical products in various health fields. The technologies for all these seemingly unconnected ventures essentially evolved out of the development of luminous pigment; technologies for handling radioactive substances, manufacturing fluorescent substances, and paint printing. New fields of research grew out of the constant growth and development

based on these core technologies. "We're continuing the research, because if LumiNova can be made even brighter and emit light for much longer, it can be used as lighting. We hope that our company's technology is useful and contributes to the world environment through the sensors we make, and in fields that affect lives such as the development of medical and pharmaceutical products," said President Matsuzawa.



#### Nemoto & Co., Ltd.

Takaidohigashi 4-10-9, Suginami-ku, Tokyo  
Telephone: 03-3333-2711  
Fax: 03-3333-2712  
http://www.nemoto.co.jp