

Light to prevent accidents on the road

Did you know that Ushio light is used by police in traffic monitoring systems to read the license plates of automobiles and track the movement of criminals, or that it is used in systems that monitor electronic toll collection gates? "This area includes a great deal of confidential information, so I can't go into much detail," says the development manager.

"Ordinary visible light, and flash lights in particular cannot be used in these applications because of the danger of blinding drivers and causing accidents. For that reason, infrared light that is invisible to the human eye is used with surveillance cameras. With highway monitoring systems, the photographic subjects (automobiles) move at high speeds. On ordinary roads, this requires shutter speeds of 1/1000th of a second, while on expressways, an even higher 1/2000th of a second is needed. Enabling such high speed photography requires light sources that meet many requirements, including brightness sufficient to illuminate objects dozens of meters removed from the camera, toughness to endure constant use, weather resistance for

use outdoors, and sufficient durability to eliminate the need for frequent replacement."

To achieve this, Ushio applies strict quality controls to the entire manufacturing process. Infrared LEDs used for illumination are constructed entirely of parts that have cleared temperature cycle testing over a range extending from -20 degrees Celsius to 60 degrees Celsius. This strict inspection regime reflects the depth of Ushio's commitment to product quality. The trust and confidence that it enjoys as a top maker of light sources is why it is used in applications of a public nature, such as highway monitoring systems.

"At ETC (electronic toll collection) gates, photos taken must be clear enough to allow positive identification of both the driver and the license plate at the same time. The problem is that the windshields of many modern cars are coated with films that cut not only ultraviolet, but infrared light as well. This is meant to help keep the temperature down when cars are exposed to sunlight. Photographing the interior of a car requires that infrared light enter the car through the windshield, be reflected inside the car, and then

be returned to the camera by passing through the windshield again. That is, the infrared illumination must be strong enough to pass through the windshield twice. What's more, light sources must be individually adjusted to suit varying conditions in a variety of locations, including compensating for light from the sun during the daytime and glare from headlights at night. This makes a adjustment very challenging," says the development manager as he speaks of the bright future prospects for traffic monitoring systems.



Light installation at a toll gate
Ushio light supports videography that provides evidence of illegal toll gate passage.

"In the future, it might be possible to prevent traffic accidents on ordinary roads by leveraging the GPS capabilities built into devices such as car navigation systems and Smartphones. We would like to see light make a contribution to road safety as well as surveillance."

Preventing crime and natural disasters with light

The ubiquitous security surveillance camera: You see them in train stations and air terminals, stores and elevators. These days, it's not unusual for the high-definition images provided by such cameras to contribute to unmasking crimes and making arrests for criminal offenses. Our developer says that looked at from a different perspective, it is not only high camera sensitivity that enables such accomplishments, but the variety of methods that are employed to provide illumination for night photography.

"For example, when a person is standing in front of a strong backlight, auxiliary lighting is needed to keep them from appearing in the image as nothing but a dark shadow.

Safety



Smuggling and theft,
malicious traffic violations.

Inspections using light and special cameras
put an end to cat-and-mouse games.

Preventing with Light

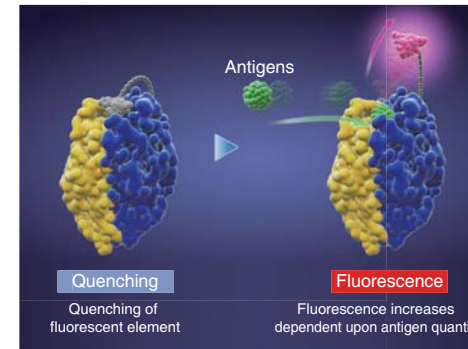


Infrared LED projector
Adoption of LEDs achieves low power consumption and long life. It contributes to reducing running costs and maintenance costs.

Further, when scenic or environmental considerations preclude the use of continuous visible illumination, as is the case with rural locations and rivers, infrared lighting must be used instead. While infrared light is often used to conceal knowledge of monitoring from criminals, visible light may also be used to serve as a deterrent.”

In addition to crime prevention, Ushio light also plays a role in surveillance to prevent disasters due to natural phenomena such as rising rivers and debris flows. “Situations like this require sturdy bodies that can withstand natural disasters. Surveillance lighting requires both toughness and high-precision light concentrating technology. Ideally, the light used to illuminate objects at a distance should be uniform, highly directional and highly collimated. However, limiting angular dispersion too much limits monitoring to a narrow range. It is a challenge to achieve the right balance between light output and illumination angle according to distance.”

Currently, Ushio is working on adapting LEDs to such lighting applications. Whereas the size of conventional lamps changes little with increased wattage, the output achievable with LEDs is still limited, and greater output is obtained by increasing the number of LED elements. Such lamps must also clear size and weight restrictions at installation sites. Ushio’s technology team has taken up this challenge,



What is "Q-body"?
Q-body is an immunoassay element that fluoresces in reaction to a specific substances (an antigen). Its specificity enables precise, high-sensitivity measurements.

creating new light to serve in preventing crime and disasters.

Providing reassurance with world-first technology

Threats we face in daily life mycotoxins and harmful additives in food, viruses and bacteria. Preventing the diffusion of such agents calls for a system that is capable of providing quick inspection.

Responding to this need, USHIO developed the Q-body inspection system, which is based on antibody fluorescence measurement technology (Q-body technology). Ushio's Q-body reagent fluoresces upon binding with the antigens in specific substances, and the presence and density of the substances can be detected at the nanogram level by measuring the change in intensity of that fluorescence. Says the development manager, “Q-body was born with the aim of contributing to society by combining light and cutting-edge bio-technology in the creation of new value.”

“Q-body does away with the troublesome work of washing and diluting, and allows measurements with a high degree of sensitivity. Whereas conventional immunoassays take 10 to 20 minutes to return a result, Q-body produces results in seconds.

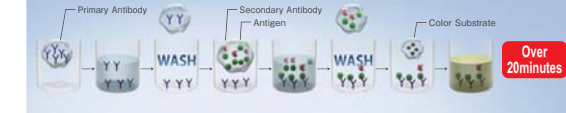
Using Q-body technology, it is also possible to develop reagents that react with a variety of types of specimens,

Comparison of measurement procedures

Q-body assay



Competitive ELISA



Immunochromatography



such as toxic substances and pollutants in food, a variety of types of markers in blood, and infectious pathogens. This makes it a useful means of preventing infectious diseases and food contamination. “To guard the security of life, we would like to see this technology adopted in diverse areas, such as the environment and food safety. Q-body reagents can help do this by making threats to security visible on a daily basis.”

Q-body is a completely new technology that overturns conventional wisdom regarding immunoassay methods. Carrying big possibilities in its small body, it represents a wonderful blend of light and bio-technology.