

# Phosphorescent Pigments GSS Series

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## **Features of Phosphorescent Pigments GSS (ZnS type)**

Nemoto GSS series are glow-in-the-dark pigments characterized by their ability to absorb/store the energy of natural/artificial lights and to emit it in the form of visible light in the dark. The cycle of absorbing, storing, and emitting is repeated over a long period of time.

Standard GSS consists of very fine crystals of zinc sulfide doped with copper (ZnS:Cu) and it does not contain any radioactive substance.

## **Product range:**

	<i>Standard series</i>	<i>Small particle version</i>
<i>Product number</i>	<i>GSS</i>	<i>GB-U</i>
<i>Body color</i>	<i>Light yellow</i>	<i>Light yellow</i>
<i>Emission color</i>	<i>Yellowish green</i>	<i>Yellowish green</i>
<i>Particle size(Ave.)</i>	<i>21 <math>\mu</math> m</i>	<i>17 <math>\mu</math> m</i>
<i>Specific gravity</i>	<i>4.1</i>	<i>4.1</i>
<i>Features</i>	<i>High initial brightness, Longer afterglow</i>	<i>Slightly lower and shorter than GSS</i>

## **Body color & Emission color:**

### **Body color:**

The body color of natural GSS is light yellow to yellowish green. Colored versions are also available with colorants

(B = Blue, G = Green, Y = Yellow, O = Orange, R = Red, etc.)

### **Emission color:**

The emission color of GSS is yellowish green which is the color that is the brightest to the perceptibility of the human eyes (around 530 nm).

## **Phosphorescent intensity:**

Phosphorescence of phosphorescent pigments will remain visible in the dark for some 2 to 4 hours (Fig. 3), but is dependent on the kind and intensity of excitation energy, the type of phosphorescent pigment, ambient light, dark adaptation of the eyes, area of and distance from the phosphorescence, etc.

*Light containing more UV energy (Fig. 1) is more effective as an excitation source. For example, assuming a tungsten filament lamp at 100%, a white color fluorescent lamp will be 180% and a black lamp 220%. The level of brightness differs from type to type of phosphorescent pigment. Grade GSS is about 1.4 to 1.5 times higher in initial brightness and longer in afterglow than the Grade GBU (Finer particle version of GSS). The level of brightness increases with the particle size, however the hiding power and the dispersion characteristic decrease as the particles become bigger. A particle size of 15 to 25 $\mu$ m is the industry's standard in terms of brightness and processibility.*

### **Visibility:**

*When entering into a dark place, for example a theatre, one cannot see anything at first, but as the eyes get used to the darkness, objects become visible. This is known as the dark adaptation of the eyes. This phenomenon is explained by the two functions of human visual nerve system, one for the bright side and the other for the dark. Because phosphorescence is a relatively weak emission of light, visibility would vary to a great extent by the level of dark adaptation of the eyes as well as by the ambient darkness. The darker the surroundings, the higher the visibility becomes. Healthy human eyes have a threshold of brightness of 0.01 mcd/m<sup>2</sup>, but of course, the level and duration of visibility depend on the dark adaptation of the eyes, ambient light and the shape, size, distance, etc. of the phosphorescence.*

### **Light stability:**

*Extra care is taken in the course of manufacturing to ensure the light fastness characteristic, but the zinc sulfide based phosphorescent pigments could be affected by outdoor use over a long period of time. Use of UV absorbers would be useful for protection of the phosphorescent products, but it works also for blocking UV which is the most effective excitation light source.*

### **Safety features:**

*Our phosphorescent pigments are free from cadmium, lead, mercury, arsenic, chromium, antimony, and selenium. (Test results by The Japan Food Hygiene Association according to the Notice No.21 of The Ministry of Health and Welfare) and LD50 test on rats by The U.S. Testing Company confirms the same.*

### **Other applications:**

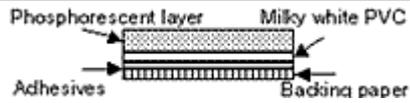
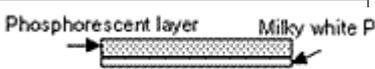
*Phosphorescent pigments can be used as phosphorescent glazes. A specially prepared glaze withstands high temperature baking at 800 - 850 ° C.*

Phosphorescent pigment can also be processed in paraffin, but a special method of dispersion is required for processing.

**Application examples:**

Phosphorescent Mark	Switch, Electric outlet, Flashlight, Particle in a darkroom, Slip-proof stair-noses, Handrail, Plinth, Tile, Floor, Wall sign and others
Phosphorescent Signboard	Emergency exit signs, Emergency articles, Fire extinguisher, Fireplug, Fire alarm, Life preserver, Ventilator, Step sign and others
Ornaments	Ashtray, Lighter, Cigarette case, Necklace, Earring, Tablecloth, Curtain, Lampshade, Tile, Wallpaper, Textile and others
Others	Toy, Fishing tackle, Stationery, Throwaway item, Fishing implements and others

**GSS Products (semi-finished materials):**

Article	Lumi-sheet (Soft PVC vinyl)	Lumi-plate (Rigid PVC plate)	
Model number	(1)NSSL-025A-90S	(2)NSSL-04A-120SD	*NSP-36SD
Dimensions	0.25 × 1000mm × 50m	0.4 × 1000mm × 50m	1 × 910 × 1,820mm
Remarks	With adhesives	With adhesives	Without adhesives
Structure	 <p>1) Standard type: For toys, fishing gears, regular signs 2) High brightness type: For emergency exit signs</p>	 <p>** Applications: Emergency exit signs</p>	

\*\* High brightness type