Illuminating Safety Cone

CROSS-REFERENCE TO RELATED APPLICATIONS

None. This application is a first application to Intellectual Property of Singapore for a Singapore Patent.

FIELD OF THE INVENTION

This invention relates to safety warning device that emit narrow bandwidth of electromagnetic wave that is most sensitive to human retina in low or no illumination environment.

BACKGROUND OF THE INVENTION

Many illuminating devices currently uses light emitting diode (LED) or filament wire as sources of electromagnetic wave emitter. The bandwidth ranges from 400 nm to 700 nm, in the human visible. Many takes the bandwidth range convention from 610 nm to 700 nm for red, 590 nm to 610 nm for orange and 570 nm to 590 nm for yellow. These ranges are preferred as they are traditional associate with warning of danger and hazard. However, these contemporary illuminating devices have proven to have limitations.

LED and filament are both point source emitters. The electromagnetic waves emit are concentrated on a small area surface. To diffuse these point sources into a more uniform lit up surface across larger and useable area, additional devices, such as diffuser, lenses or diffractive silts are needed to eliminate the optical hot spots.

The optical intensity of LED and filament are directly dependent on current supplied. To achieve higher intensity illumination, higher current is needed to be drawn from the power source. This results in more energy loss through heat lost. And it leads to faster drain of electrical charges capacity from portable battery cells.

When the light intensity is low, photoreceptor cells in human eye retina began to shift their reliance from cones to rods. Rod photoreceptor is poor in receptive to the bandwidth range from 590 nm to 700 nm. This range is also happen to be the wavelength of electromagnetic waves emitted by the contemporary warning device. In order to attract enough attention, these devices have to intensify their emission, thus putting more demand on energy consumption.

SUMMARY OF INVENTION

According to an exemplary aspect, there is provided a safety warning device comprising of: an illumination film to provide warning light; a main body compartment that house the batteries and electronics and supply the necessary electricity form; a protective cap to provide protection to the main housing.

The illumination film is a flexible polymer sheet coated with multilayers of material to achieve the necessary illumination function. The multilayers includes, may not be limited to, minimum three layers:

(i) a back conductive layer, (ii) luminous layer, (iii) a front transparent or translucent conductive layer. One example of back conductive layer is silver paste; and one example of luminous layer is phosphorus doped in minerals; and one example of a front transparent or translucent conductive layer is indium tin oxide. Other examples of conductive film, both front and back, are carbon nano tubes and graphene.

The chemical chosen for the illuminous layer emit electromagnetic wavelength between 478 nm to 518 nm. The selection of this bandwidth of wavelength coincide with the bandwidth range that is most receptive by the human eye rod photoreceptor. When the surrounding ambient began to dim, our human eye began to shift our reliance from cone photoreceptor to rod photoreceptor. In the dark, the sensation perceptive of electromagnetic wavelength between 478 nm to 518 nm is heighten. The human eye perceive this bandwidth illumination as more intense as compare with illumination of other wavelength of the same lux. Such design allow the invention to operate at lower lux and in turn lower power consumption, which can facilitate to prolong the usage hours of portable battery pack.

The illumination locality of LED is at the junction of two different materials, making it point source emitter. When put in practical use, these points appear to be optical hot spots. Additional optical components are required to incorporate with the LED to disperse these hot spot into a useful uniform illuminating area. However, such dispersion incur energy losses. On the other hand, the illumination locality of illuminous layer in this invention is spread across the material homogenously. The illuminous layer eliminate the need additional optical components which increase the light transmission efficiency. Thus lower power demand and prolong battery discharging time.

The illumination technology utilize in this invention requires alternating current (AC) electricity of high voltage, at least 24 V per junction, but low current, less than 0.2 mA per square inch. The low AC current drawn during helps to reduce energy lost through electricity energy transformation into unwanted heat energy. This design further reduce the rate of power consumption of battery power charges.

The main body compartment contains electronics to provide necessary electricity types to lit up the illuminous layer. The main housing also contain rechargeable dry cells to storage power for the whole devices.

A protective cap is included in the invention to provide protection to the main housing against elements of weather.

BRIEF DESCRIPTION OF FIGURES

In order that the invention may be fully understood and readily put into practical effect there shall now be described by way of non-limitative example only exemplary embodiments of the present invention, the description being with reference to the accompanying illustrative drawings.

Figure 1	Fully assembled view of a first embodiment of the illuminating safety cone
Figure 2	Cross section view of fully assembled of a first embodiment of the illuminating safety cone
Figure 3	Exploded view of a first embodiment of the illuminating safety cone
Figure 4	Perspective view of main housing
Figure 5	Assembly view of protective cap and main body compartment
Figure 6	Assembled view of first embodiment without safety cone

DETAILED DESCRIPTION

An exemplary embodiment of the safety warning device will be described with reference to Figure 1 to Figure 5 below.

As shown in Figure 1, the safety warning device comprises of a protective cap 100, illumination film 200 and main body compartment 300 not shown in Figure 1. The device is shown as assembled on an external safety cone 400 to illustrate how the device will appear when in use.

In Figure 2, cross section view of the safety warning device is shown with the main body compartment 300 assembled with the protective cap 100 and illumination film 200. The protective cap 100 is function as a cover to prevent weather element such water, ice or snow from entering the internal of the main housing 300. The protective cap may comprise further with an O-ring to provide sealing and screw thread for fastening to the main housing 300. The illumination film 200 draws power from main housing 300 to lit up.

Figure 3 show the exploded view of the safety warning device. The main body compartment 300 house the battery 301. The battery 301 can be either re-chargeable or non-reusable dry cells. Battery 301 provide all the energy that is require to lit up the illumination film 200. The illumination film 200 is composed of at least 3 layers of material. One layer of back conductive layer, another layer of luminous material and transparent or translucent conductive layer. The illumination film is to emit electromagnetic wave of wavelength between 478 nm to 518 nm. The electronic board 202 convert the DC electricity drawn from the battery 301 into an AC electricity of voltage at least 24 V, current of less than 5 mA and alternating at frequency at least 50 Hz. The main housing 300 body is made up of two part, the lower body 304 and battery cover 305. Lower body 304 contain all the other parts in it. Battery cover 305 allow easy access to the battery 301.

The exterior of the main body compartment 300 is display in Figure 4. The main housing 300 has indicator light 307 which lit up red during charging and lit up green when fully charged. Main housing 300 also has a round jack 308 to plug in external power to charge battery 301 if its configuration is rechargeable type.

Figure 5 show the layout of the electrical connection between the illumination film 200 and snap connector 203. Mounted on the electronic board 202 is a pair of snap connector 203. The male part of the connector is mounted on the electronic board 202. The female part is mounted on the illumination film 200. The use of snap connector 203 eliminate the need to use wires and connectors to illumination film 200.

Figure 6 show the device as assembled without safety cone 400 to illustrate how the device will appear when stand alone.

CLAIMS

The invention claimed is

1. A safety warning device when activated, emit electromagnetic bandwidth of wavelength form 478 nm to 518 nm that coincides with the electromagnetic that is most receptive by the human eye rod photoreceptor in low light or no light ambience surrounding.
2. The safety warning device of claim 1, emit a lower intensity light as compared to contemporary yellow and red warning light, and yet able to attract the equivalent level of attention.
3. The safety warning device of claim 1 is designed as a direct mount on to existing road safety cone.
4. The safety warning device of claim 1 use snap fit buttons as connectors, one part mounted on an electronic board, the other part mounted on the illumination film.
5. The design of claim 4 eliminates the need to use wires and connectors for the electrical connection.
6. The safety warning device for use in the low light or no light environment, comprises of
    a. an illumination film to provide warning light;
    b. a main body compartment that house the batteries and electronics and supply the necessary electricity form;
    c. a protective cap to provide protection to the main housing.
7. The safety warning device of claim 1 has a protective cover that have a series of tongue and grove between 3 to 5 counts, on both the main body compartment and the protective cap, to provide a seal against snow, ice and water flow.
8. The safety warning device use electroluminescence technology to achieve uniform illumination without the need of additional optical components.
9. The safety warning device use electroluminescence technology reduce energy consumption rate to increase the portable battery usage time.