FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
AND
THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

(See Section 10; rule 13)

TITLE OF THE INVENTION

"SWITCHABLE LUMINESCENT SEE-THROUGH SYSTEM"

APPLICANT

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The following specification particularly describes
the invention and the manner in which
it is to be performed

Claims

[Claim 1] A switchable luminescent system characterized in that it is transparent in the off-state and it is luminescent in the on-state and it comprises:

- a transparent supporting means (10) having an arbitrary shape and limited by one or more surfaces (11), wherein modifications to said supporting means (10) are not intentionally introduced with the purpose of inducing visible light scattering;
- a luminescent material (20) coated onto one or more portions of said surfaces (11) of said transparent means (10) wherein modifications to said luminescent material (20) are not intentionally introduced with the purpose of inducing visible light scattering;
- one or more excitation sources (30) able to generate electromagnetic radiation (31) having a suitable spectrum for exciting said luminescent substance (20) and allowing for the transition of said switchable luminescent system from the off-state to the on-state.

[Claim 2] A switchable luminescent system, as recited in claim 1, characterized in that said transparent means (10) is a monolithic glass sheet or item, a polymer, a plastic material, a glass-ceramic material, or a combination thereof such that they make an heterogeneous transparent material, preferably a laminated material or a double glazed windows.

[Claim 3] A switchable luminescent system, as recited in claim 1, characterized in that said luminescent material (20) contains one or more luminescent or fluorescent substances (21) having different excitation and emission spectra, preferably comprising phosphors, nanoparticles, quantum dots, transition-metals complexes or other organic or inorganic luminophor substance, and said luminescent or fluorescent substances (21) must have size that do not significantly induce the diffusion of visible light,

[Claim 4] A switchable luminescent system, as recited in the preceding claim, wherein said luminescent or fluorescent substances (21) are characterized by an absorption spectrum as low as possible in the visible region to avoid a visible coloring of said luminescent material (20) in the off-state.

[Claim 5] A switchable luminescent system, as recited in one or more of the preceding claims, characterized in that said one or more luminescent or fluorescent substances (21) are dispersed in a transparent organic or inorganic matrix (22).

[Claim 6] A switchable luminescent system, as recited in one or more of the preceding claims, characterized in that said luminescent or fluorescent substances (21) is in the form of a luminescent o fluorescent varnish or ink or a inorganic coating or a polymeric film.

[Claim 7] A switchable luminescent system, as recited in claim 1, characterized in that said one or more excitation sources (30) are preferably LED, lasers, neon light sources, discharge lamps, transparent window frame with integrated LED or other point-like or diffuse luminous sources having any continuous or discrete emission spectrum, preferably in the high-energy tail of the visible spectrum (or the near UV region), and able to induce fluorescence, phosphorescence or other luminescence processes in said luminescent material (20) wherein the maximum excitation wavelength l_1 is less than maximum emission wavelength l_2.

[Claim 8] A switchable luminescent system, as recited in one or more of the preceding claims, characterized in that said one or more excitation sources (30) are placed in such a way that said electromagnetic radiation (31) propagates as a light beam within said transparent means (10), said transparent means (10) being highly transparent to said exciting electromagnetic radiation (31).

[Claim 9] A switchable luminescent system, as recited in claim 8, characterized in that said transparent means (10) is a plane or curved sheet and said electromagnetic radiation (31) is injected in the transparent means (10) from the edges (13) i.e. in the configuration named 'edge light injection'.

[Claim 10] A switchable luminescent system, as recited in claim 8, characterized in that said transparent means (10) is a plane or curved sheet and said electromagnetic radiation (31) is injected laterally in the transparent means (10) by means of a transparent wedge (15), coupled to one or more surfaces (11) of said means (10), i.e. in the configuration named 'side light injection', in such a way that luminescence to existing in-place structures can be given.

[Claim 11] A switchable luminescent system, as recited in one or more of the preceding claims, characterized by a combination of a plurality of luminescent system in 'edge light injection', 'side light injection' or others configurations and wherein said switchable luminescent system comprises reflecting surfaces attached to one or more of said surfaces (11), provided that said reflecting surfaces not change the see-through characteristic of said switchable luminescent system in the off-state.

[Claim 12] A switchable luminescent system, as recited in one or more of the preceding claims, wherein said luminescent material (20) is preferably coated by means of roto-offset printing, rotogravure printing, lithography, flexography, tampography, serigraphy, ink-jet, laser, additive manufacturing, hot printing, lenticular printing, thermal transfer, by means of adhesive films or transferable or lamination and any other printing or varnishing processes; thin film deposition techniques, preferably, CVD, PECVD, MOCVD, dip-coating, spin-coating roll-coating, air-knife coating, spray-pyrolysis; powder varnishing, dry-offset, xerography, or other technically equivalent methods for dry printing.

[Claim 13] A switchable luminescent system, as recited in one or more of the preceding claims, characterized in that said luminescent material (20) is a suitable formulation that allows for the removal of said luminescent material (20), by means of chemical solvent or mechanical means without damaging the portions of the surfaces (11) where said luminescent material (20) is coated or attached thereto.

[Claim 14] A switchable luminescent system, as recited in one or more of the preceding claims, characterized in that said portions of the surfaces (11) are excited selectively by said plurality of excitation sources (30), by means of a suitable programmable controller, in order to allows for a dynamic visual communication, adaptable accordingly to the situation said luminescent system is placed whereto.

[Claim 15] A switchable luminescent system, as recited in one or more of the preceding claims, characterized by what is described and showed with reference to the attached invention drawings.

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