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Title: Article for clothing including glove, shirt and pant, comprises multilayer material, flexible layer, flexible outer layer, flexible inner layer, detector, source electromagnetic signal, power source, and second signaling layer

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Abstract: NOVELTY - The article comprises: a multilayer material (100) including a first signaling layer (120) configured to propagate an electromagnetic signal (140); a flexible layer configured to enclose the signaling layer; a flexible outer layer (130) configured adjacent to the signaling layer; a flexible inner layer (110) configured adjacent to the signaling layer; a detector configured to detect a change in the electromagnetic signal from the signaling layer indicating a breach the multilayer material; a source the electromagnetic signal; and a power source.

USE - The article is useful for clothing including a glove, shirt, pant, coverall, apron, shoe covering, or head covering (claimed).

ADVANTAGE - The article can be simply and economically manufactured.

DETAILED DESCRIPTION - The article comprises: a multilayer material (100) including a first signaling layer (120) configured to propagate an electromagnetic signal (140); a flexible layer configured to enclose the signaling layer; a flexible outer layer (130) configured adjacent to the signaling layer; a flexible inner layer (110) configured adjacent to the signaling layer; a detector configured to detect a change in the electromagnetic signal from the signaling layer indicating a breach the multilayer material; a source the electromagnetic signal; a power source operably coupled to the source the electromagnetic signal; a second signaling layer including a chemical compound; a second detector configured to detect the gas-phase chemical compound or a reaction product in the environment indicating a breach the multilayer material; a second remote receiver; a remote receiver; and an indicator showing presence the electromagnetic signal within the signaling layer. The flexible layer, the flexible inner layer and the flexible outer layer are substantially impermeable to an environment and to the electromagnetic signal. The signaling layer is configured to transmit a change in the electromagnetic signal upon exposure the signaling layer to the environment. The flexible inner layer and the flexible outer layer are configured to enclose the signaling layer. The detector is configured to: contact the multilayer material; directly detect the change in the electromagnetic signal from the signaling layer; operate at a distance from the multilayer material; remotely detect the change in the electromagnetic signal from the signaling layer; operate as a portable unit, a handheld unit, or a unit embedded into walls, furniture, or instruments; measure absolute level the electromagnetic signal; measure a comparison between absolute levels and baseline levels the electromagnetic signal; measure changes wavelength the electromagnetic signal; measure wavelength spectra the electromagnetic signal; measure time priles the electromagnetic signal; store signaling data or metadata on board the detector for future readout; and transmit signals to the remote receiver. The electromagnetic signal includes an ultraviolet signal, a visible light signal and/or an infrared signal. The signaling layer includes optical threads and/or optical fibers, electromagnetic energy

waveguides, a radirequency signal, a microwave signal and/or a terahertz signal. The electromagnetic signals include a change in intensity, a change in phase, difference in polarization state, a change in peak power, or a change in direction the electromagnetic signal. The signals operably coupled to the remote receiver are wireless. The signals are delivered by wire or by a physical storage media. The signals to the remote receiver contain information on wavelength spectrum the electromagnetic signal, time prile the electromagnetic signal, electromagnetic signal magnitude, or electromagnetic signal magnitude compared to baseline. The detector and the multilayer material include a radio frequency identification sensor and a radio frequency identification reader. The detector is configured to: form a component the multilayer material; electromagnetically coupled to the signaling layer; operate in contact with the multilayer material; and operate at the distance from the multilayer material. The signaling layer includes electromagnetic signals that: differ in wavelength spectrum, time prile, intensity, phase, polarization state, peak power, direction, or duty cycle; and occupy substantially a same/different location laterally or vertically in the signaling layer. The detector further provides metadata to a computing device. The metadata includes multilayer material identification, user identification, location a breach in the multilayer material, detection event time, or multilayer material location. The detector or the remote receiver is configured to communicate with the computing device. The computing device is configured to activate a user interface configured to inform a wearer the multilayer material, a coworker, an individual, a supervisor, a safely ficial, a manufacturer the multilayer material, a seller the multilayer material, or an insurance ficial. The second signaling layer includes the chemical compound configured to produce a gas-phase chemical compound configured to be released into the environment upon exposure the chemical compound to the environment. The chemical compound includes a gas-phase chemical compound, a liquid chemical compound, or a solid chemical compound. The second detector is configured to deliver a second signal to the second remote receiver. The gas-phase chemical compound in the second signaling layer is configured to diffuse to a second detector. The gas-phase chemical compound is substantially removed from the environment within a specified time. The second signal to the second remote receiver includes data associated with the identity the gas-phase chemical compound, concentration the gas-phase chemical compound, comparison concentration the gas-phase chemical compound to baseline, or ratio concentrations gas-phase chemical compounds. The chemical compound is microencapsulated in the signaling layer. The remote receiver is configured to: receive a signal from a first detector configured to detect a change in the electromagnetic signal from the signaling layer indicating a breach the multilayer material; and detect the gas-phase chemical compound or a reaction product released from the second signaling layer into the environment indicating a breach the multilayer material. An INDEPENDENT CLAIM is included for a system.

DESCRIPTION DRAWING(S) - The diagram shows a schematic view a system.

Multilayer material (100)

Flexible inner layer (110)

First signaling layer (120)

Flexible outer layer (130)

Electromagnetic signal. (140)

Drawing:

Derwent Class Code(s): L03 (Electro-(in)organic, chemical features electrical devices); P73

(Layered products); T01 (Digital Computers); T04 (Computer Peripheral Equipment); W06 (Aviation, Marine and Radar Systems)

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