CLAIMS

1. A composite security marking for a physical object comprising: a physical unclonable function, PUF; and a representation of a digital signature (3) or of a pointer indicating a location where said digital signature can be accessed; wherein the digital signature digitally signs a hash value resulting from application of a predetermined cryptographic hash function to data representing a response generated by the PUF in reaction to a challenge of a predetermined challenge-response authentication scheme; wherein the PUF comprises an up-converting dye, UCD; and wherein said data representing a response generated by the PUF in reaction to a challenge of a predetermined challenge-response authentication scheme for said UCD represents a spectral barcode having a continuous or a quantized range of allowed spectral values for a selected discrete subset of wavelengths and/or a characteristic lifetime of a luminescence effect occurring in the response.

2. The composite security marking according to claim 1, wherein the security marking is an anti-counterfeit product marking.

3. The composite security marking according to claim 1, wherein the PUF comprises an unclonable physical pattern or a structure configured to generate a virtual pattern in response to the challenge.

4. The composite security marking according to claim 3, wherein said structure configured to generate a virtual pattern comprises a microstructure being configured to create an optical speckle pattern when illuminated with light of a suitable light source.

5. The composite security marking according to claim 3, wherein said data representing a response generated by the PUF in reaction to a challenge of a predetermined challenge-response authentication scheme for said unclonable physical pattern or structure configured to generate a virtual pattern represents at least one recognized aspect or portion of said physical pattern or said virtual pattern, respectively.

6. The composite security marking according to claim 1, wherein the PUF comprises at least one of the following: an image in which hidden information is steganographically embedded; an image that is printed with an ink containing one or more types of up-converting dyes, UCD; a hologram containing hidden phase-coded or frequency-coded information.

7. The composite security marking according to claim 1, wherein the composite security marking comprises said pointer and said pointer indicates a routing to a server from which the digital signature can be retrieved.

8. The composite security marking according to claim 1, wherein the composite security marking comprises at least one component resulting from an additive manufacturing process and the PUF is contained in or otherwise forms part of that component.

9. A physical object comprising the composite security marking according to claim 1.

10. The physical object according to claim 9, wherein: the object is a product comprising one or more items for consumption or use and a packaging thereof; and the PUF of the composite security marking is arranged on or contained within at least one of the items for consumption or use, while the representation of or pointer to the digital signature is arranged on or within the packaging.

11. The physical object according to claim 9, comprising one or more of the following items for consumption or use: pharmaceutical or cosmetic compound or composition; medical device; laboratory equipment; spare part or component of a device or system; pesticide or herbicide; seeding material; coating, ink, paint, dye, pigments, varnish, impregnating substance, functional additive; a raw material for additive manufacturing of products.

12. The composite security marking according to claim 1, wherein said representation of the digital signature or the pointer is implemented by one or more of the following: (i) an alphanumeric sting; (ii) a graphical or image representation; (iii) a one-dimensional or multi-dimensional barcode; (iv) a de-

vice transmitting a signal carrying the representation of the digital signature or pointer.

13. The composite security marking according to claim 12, wherein said device is a short-range wireless chip.

14. A method of providing a physical object with a composite security marking, the method comprising: adding a physical unclonable function, PUF, to an object to be marked; applying a challenge of a predetermined challenge-response authentication scheme to said PUF to trigger a response according to said authentication scheme in reaction to said challenge; detecting said response; applying a predetermined cryptographic hash function to data representing said response to obtain a hash value; signing said hash value with a digital signature; and adding a representation of the digital signature or of a pointer indicating where the digital signature can be accessed to the object to be marked; wherein the PUF comprises an up-converting dye, UCD; and wherein said data representing a response generated by the PUF in reaction to a challenge of a predetermined challenge-response authentication scheme for said UCD represents a spectral barcode having a continuous or a quantized range of allowed spectral values for a selected discrete subset of wavelengths and/or a characteristic lifetime of a luminescence effect occurring in the response.

15. The method according to claim 14, wherein the step of adding the PUF to an object to be marked comprises one or more of the following: adding the PUF to a coating material to obtain a PUF-enhanced coating material and applying the PUF-enhanced coating material to a physical object to be marked; adding a PUF to a raw material or an intermediate material before or while producing thereof a physical object to be marked; adding a PUF to a raw material or fusion agent of an additive manufacturing process, for producing a physical object to be marked or at least a part of such object.

16. An apparatus for providing a physical object with a composite security marking, wherein the apparatus is adapted to perform the method of claim 14.