CLAIMS

What is claimed is:

1. An apparatus, comprising:

a photon emitter configured to emit photons onto a surface of an article in a photon pulse,

a photon detector array coupled to a telecentric lens, configured to receive both scattered photons and fluoresced photons from surface features of the article, wherein the telecentric lens is a double telecentric lens; and

a processing means configured for:

processing photon-detector-array signals corresponding to the scattered photons and fluoresced photons received by the photon detector array during the photon pulse and subsequent to the photon pulse, respectively, and

classifying the surface features from the photon-detector-array signals corresponding to the scattered photons and the fluoresced photons.

~~2. The apparatus of Claim 1, further comprising a telecentric lens, wherein the telecentric lens is coupled to the photon detector array.~~

~~3~~2. The apparatus of Claim 1, wherein classifying the surface features comprises classifying the surface features as inorganic or organic by contrasting photon-detector-array signals corresponding to the scattered photons and the fluoresced photons.

~~4~~3. The apparatus of ~~any one of Claims 1-3~~Claim 1 or 2, wherein the processing means is further configured for producing:

a map of the surface features from the scattered photons.

~~5~~4. The apparatus of ~~any one of Claims 1-3~~Claim 1 or 2, wherein the processing means is further configured for producing one or more maps of the surface features from the fluoresced photons.

~~6~~5. The apparatus of ~~any one of Claims 1-3~~Claim 1 or 2, wherein the processing means is further configured for producing

a map of the surface features from the scattered photons; and

one or more additional maps of the surface features from the fluoresced photons,

wherein the one or more additional maps of the surface features from the fluoresced photons provides classifying information by contrast with the map of the surface features from the scattered photons.

~~7~~6. The apparatus of Claim 1, further comprising one or more additional photon emitters configured to emit photons onto the surface of the article.

~~8~~7. The apparatus of any one of Claims 1, 2 ~~3~~ and ~~7~~6, wherein the processing means is further configured for processing photon-detector-array signals corresponding to photons received by the photon detector array during one or more additional pulses of photons subsequent to the photon pulse and in-between the one or more additional pulses of photons subsequent to the photon pulse.

~~9~~8. The apparatus of any one of Claims ~~1-3~~1, 2 and ~~7~~6, wherein the processing means comprises one or more computers or equivalent devices, operable to classify the surface features from the photon-detector-array signals.

~~10~~9. An apparatus, comprising:

a photon emitter configured for emitting photons onto a surface of an article,

a photon detector array coupled to a telecentric lens, configured for receiving both scattered photons and fluoresced photons from surface features of the article, wherein the telecentric lens is a double telecentric lens,

wherein the photon emitter and the photon detector array are synchronized with respect to emitting photons and receiving photons; and

the photon emitter is a flash lamp configured to minimize vibrations while the photon detector array receives the scattered photons; and

a processing means configured for:

processing photon-detector-array signals corresponding to the scattered photons and the fluoresced photons received by the photon detector

array during one or more pulses of photons and in-between the one or more pulses of photons, respectively, and

classifying the surface features from the photon-detector-array signals corresponding to the scattered photons and the fluoresced photons.

~~11~~10. The apparatus of Claim ~~10~~9, wherein classifying the surface features comprises classifying the surface features as inorganic or organic by contrasting photon-detector-array signals corresponding to the scattered photons and the fluoresced photons.

~~12~~11. The apparatus of Claim ~~10~~9, wherein the processing means is further configured for producing one or more maps of the surface features from the scattered photons during the one or more pulses of photons.

~~13~~12. The apparatus of any one of Claims ~~10-12~~9-11, wherein the processing means is further configured for producing one or more maps of the surface features from the fluoresced photons in-between the one or more pulses of photons.

~~14~~13. The apparatus of any one of Claims ~~10-12~~9-11, wherein the processing means comprises one or more computers or equivalent devices operable to classify the surface features by contrasting one or more maps of the surface features derived from the scattered photons with one or more maps of the surface features derived from the fluoresced photons.

~~15~~14. An apparatus, comprising:

a photon detector array coupled to a telecentric lens, configured to receive both scattered and fluoresced photons from surface features of an article, wherein the telecentric lens is a double telecentric lens; and

a processing means configured for:

processing photon-detector-array signals corresponding to the scattered photons and the fluoresced photons received by the photon detector array during one or more pulses of photons and in-between the one or more pulses of photons, respectively, and,

classifying the surface features from the photon-detector-array signals corresponding to the scattered photons and the fluoresced photons.

~~16. The apparatus of Claim 15, further comprising a telecentric lens, wherein the telecentric lens is coupled to the photon detector array.~~

~~17~~15. The apparatus of Claim ~~15~~14, wherein classifying the surface features comprises classifying the surface features as inorganic or organic by contrasting photon-detector-array signals corresponding to the scattered photons and the fluoresced photons.

~~18~~16. The apparatus of any one of Claims ~~15-17~~14 or 15, wherein the processing means is further configured for producing a map of the surface features from the scattered photons.

~~19~~17. The apparatus of any one of Claims ~~15-17~~14-16, wherein the processing means is further configured for producing a map of the surface features from the fluoresced photons fluoresced.

~~20~~18. The apparatus of any one of Claims ~~15~~14-17, wherein the processing means comprises one or more computers or equivalent devices operable to classify the surface features by contrasting one or more maps of the surface features derived from the scattered photons with one or more maps of the surface features derived from the fluoresced photons.