

CLAIMS

What is claimed is:

1. An apparatus, comprising:
 - two photon emitters configured to emit photons onto a surface of an article;
a flash lamp configured to minimize vibrations while detecting photons scattered from features in the surface of the article;
 - a photon detector array comprising a plurality of photon detectors configured to receive photons scattered from features in the surface of the article; ~~and~~
 - a mapping means for mapping the features in the surface of the article, wherein the mapping means provides two maps of the features in the surface of the article respectively corresponding to the two photon emitters; and
a characterizing means for characterizing the features of the surface of the article based on photon scattering intensity distributions of the features.
2. The apparatus of Claim 1, wherein the two photon emitters are positioned on the same side of the apparatus.
3. The apparatus of Claim 1, wherein the two photon emitters are positioned to emit photons onto the surface of the article at different angles.
4. The apparatus of Claim 1, wherein a first photon emitter of the two photon emitters is positioned to emit photons onto the surface of the article at a glancing angle of at least 30°, and a second photon emitter of the two photon emitters is positioned to emit photons onto the surface of the article at a glancing angle of less than 30°.
5. The apparatus of any one of Claims 1-4, wherein the mapping means comprises one or more computers or equivalent devices to map features in the surface of the article from signals received from the photon detector array.

6. The apparatus of any one of Claims 1-4, wherein the apparatus is configured to characterize the features in the surface of the article by contrasting a first map of the two maps with a second map of the two maps.

7. The apparatus of any one of Claims 1-4, wherein the two photon emitters are configured to emit a first set of photons and a second set of photons, and wherein the apparatus is configured to characterize the features in the surface of the article by contrasting signals from the photon detector array corresponding to the first set of photons scattered from features in the surface of the article with signals from the photon detector array corresponding to the second set of photons scattered from features in the surface of the article.

8. The apparatus of any one of Claims 1-4, further comprising a telecentric lens coupled to the photon detector array and one or more additional photon emitters, wherein the mapping means provides one or more additional maps of the features in the surface of the article respectively corresponding to the one or more additional photon emitters.

9. An apparatus, comprising:

a plurality of photon emitters configured to emit photons onto a surface of an article at different angles;

an objective lens;

a photon detector array coupled to the objective lens comprising a plurality of photon detectors configured to receive photons scattered from features in the surface of the article; and

a mapping means for mapping the features in the surface of the article,

wherein the mapping means provides a plurality of maps of the features in the surface of the article respectively corresponding to the plurality of photon emitters.

and

wherein the photon emitters comprise a flash lamp configured to minimize vibrations while detecting photons scattered from features in the surface of the article; and

a characterizing means for characterizing the features of the surface of the article based on photon scattering intensity distributions of the features.

10. The apparatus of Claim 9, wherein the plurality of photon emitters is positioned on the same side of the apparatus.

11. The apparatus of Claim 9, wherein a first photon emitter of the plurality of photon emitters is positioned to emit photons onto the surface of the article at a glancing angle of at least 30°, and a second photon emitter of the plurality of photon emitters is positioned to emit photons onto the surface of the article at a glancing angle of less than 30°.

12. The apparatus of Claim 9, wherein the mapping means comprises one or more computers or equivalent devices to map features in the surface of the article from signals received from the photon detector array.

13. The apparatus of any one of Claims 9-12, wherein the apparatus is configured to characterize the features in the surface of the article by contrasting a first map of the plurality of maps with a second map of the plurality of maps.

14. An apparatus, comprising:

a photon detector array configured to receive photons scattered from features in a surface of an article; and

a characterization means for characterizing the features in the surface of the article based on photon scattering intensity distributions of the features,

wherein the characterization means contrasts signals from the photon detector array corresponding to two sets of photons scattered from features in the surface of the article, ~~and~~

wherein the two sets of photons respectively originate from photon emitters at different locations, and

wherein the photon emitters comprise a flash lamp configured to minimize vibrations while detecting photons scattered from features in the surface of the article.

15. The apparatus of Claim 14, further comprising a telecentric lens, wherein the telecentric lens is coupled to the photon detector array.

16. The apparatus of Claim 14, wherein a first photon emitter of the photon emitters is configured to emit a first set of photons of the two sets of photons, and a second photon emitter of the photon emitters is configured to emit a second set of photons of the two sets of photons.

17. The apparatus of Claim 16, wherein the first photon emitter is positioned to emit photons onto the surface of the article at a glancing angle of at least 30°.

18. The apparatus of Claim 16, wherein the second photon emitter is positioned to emit photons onto the surface of the article at a glancing angle of less than 30°.

19. The apparatus of any one of Claims 14-18, wherein the characterization means comprises one or more computers or equivalent devices to characterize surface features of articles with respect to type and/or size.

20. The apparatus of any one of Claims 14-~~18~~19, wherein the apparatus further comprises a mapping means for mapping the features in the surface of the article, and the mapping means provides maps of the features in the surface of the article respectively corresponding to the photon emitters.