CLAIMS

1. A method for inspecting the product of a coating process wherein a coating has been applied to the surface of a substrate to form a coated surface, the method comprising the steps:
(a) providing the product as inspection object;
(c) in a molecular flow mode of operation, measuring the release of at least one volatile species from the inspection object into the gas space adjacent to the coated surface; and
(d) comparing the result of step (c) with the result of step (c) for at least one reference object measured under the same test conditions, thus determining the presence or absence of the coating, and/or a physical and/or chemical property of the coating.

2. The method of claim 1, wherein a physical and/or chemical property of the coating is determined which is selected from the group consisting of its barrier effect, its wetting tension, and its composition, and preferably is its barrier effect.

3. The method according to claim 1 or 2, wherein step (c) is performed by measuring the mass flow rate or volume flow rate of the at least one volatile species in the gas space adjacent to the coated surface.

4. The method according to any of the preceding claims, wherein:
(i) the reference object is an uncoated substrate; or
(ii) the reference object is a substrate coated with a reference coating.

5. The method according to any of the preceding claims, comprising as an additional step between steps (a) and (c) the step of
(b) changing the atmospheric pressure in the gas space adjacent to the coated surface such that a pressure differential through the coated surface is provided and a higher mass flow rate or volume flow rate of the volatile species may be realized than without the pressure differential.

~~15~~16. The method according to any of the preceding claims, wherein the coating is a coating prepared by PECVD from an organosilicon precursor.

~~16~~17. The method according to any of the preceding claims, wherein
(i) the coating is a barrier coating, preferably is a SiO_x layer wherein x is from about 1.5 to about 2.9; and/or
(ii) the coating is a coating modifying the lubricity and/or surface tension of the coated substrate, preferably is a layer of $Si_wO_xC_yH_z$, where w is 1, x is from about 0.5 to 2.4, y is from about 0.6 to about 3, and z is from 2 to about 9.

~~17~~18. The method according to any of the preceding claims, wherein the volatile species is a volatile species released from the coating, preferably is a volatile coating component, and wherein the inspection is performed to determine the presence, the properties and/or the composition of the coating.

~~18~~19. The measurement according to any of the preceding claims, wherein the volatile species is a volatile species released from the substrate and wherein the inspection is performed to determine the presence of the coating and/or the barrier effect of the coating.

~~19~~20. The method according to any of the preceding claims, wherein the substrate is a vessel having a wall which is at least partially coated on its inner or outer surface during the coating process, and wherein preferably the coating is disposed on the inner surface of the vessel wall.

~~20~~21. The method of claim ~~19~~20, wherein a pressure differential between the vessel lumen and the exterior is established in order to measure the outgassing of the volatile species from the coated vessel wall.

~~21~~22. The method of claim ~~19-20~~ or ~~20~~21, wherein the pressure differential is provided by at least partially evacuating the gas space in the vessel.

~~22~~23. The method according to any of the preceding claims, wherein the conditions effective to distinguish the presence or absence of the coating, and/or to determine a

physical and/or chemical property of the coating include a test duration of less than one hour, or less than one minute, or less than 50 seconds, or less than 40 seconds, or less than 30 seconds, or less than 20 seconds, or less than 15 seconds, or less than 10 seconds, or less than 8 seconds, or less than 6 seconds, or less than 4 seconds, or less than 3 seconds, or less than 2 seconds, or less than 1 second.

~~23~~24. The method according to any of the preceding claims, wherein the release rate of the volatile species is modified by modifying the ambient pressure and/or temperature, and/or humidity, thus increasing the difference between the reference object and the inspection object with regard to the release rate and/or kind of the measured volatile species.

~~24~~25. The method according to any of the preceding claims, which is used as an inline process control for a coating process in order to identify and eliminate coated products not meeting a predetermined standard or damaged coating products.

~~25~~26. The method according to any of the preceding claims, wherein the coating is a PECVD coating performed under vacuum conditions and wherein the subsequent outgassing measurement is conducted without breaking the vacuum used for PECVD.

~~26~~27. The method according to any of the preceding claims, wherein the coating is a PECVD coating performed under vacuum conditions and wherein the subsequent outgassing measurement is conducted by charging the coated product with a volatile species after the coating and subsequently performing the outgassing measurement.

~~27~~28. The method of any of the preceding claims, wherein measuring is carried out using a microcantilever measurement technique.

~~28~~29. The method according to claim ~~27~~28, wherein measuring is carried out by

(i) (a) providing at least one microcantilever which has the property, when in the presence of an outgassed material, of moving or changing to a different shape;
(b) exposing the microcantilever to the outgassed material under conditions effective to cause the microcantilever to move or change to a different shape;

and

(c) detecting the movement or different shape, preferably by reflecting an energetic incident beam, e.g. a laser beam, from a portion of the microcantilever that changes shape, before and after exposing the microcantilever to outgassing, and measuring the resulting deflection of the reflected beam at a point spaced from the cantilever; or by

(ii) (a) providing at least one microcantilever which resonates at a different frequency when in the presence of an outgassed material;

(b) exposing the microcantilever to the outgassed material under conditions effective to cause the microcantilever to resonate at a different frequency; and

(c) detecting the different resonant frequency, e.g. using a harmonic vibration sensor.

~~29~~30. An apparatus for performing the method according to any of claims 1 to ~~28~~29.

~~30~~31. A computer-readable medium, in which a computer program for inspecting the product of a coating process is stored which, when being executed by a processor of a vessel processing system (20), is adapted to instruct the processor to control the vessel processing system such that it carries out the method of one of claims 1 to ~~28~~29.

~~31~~32. A program element for inspecting the product of a coating process, which, when being executed by a processor of a vessel processing system (20), is adapted to instruct the processor to control the vessel processing system such that it carries out the method of one of claims 1 to ~~28~~29.