Claims

1. A method of performing scattering microscopy,

the method comprising imaging an object comprising a surface with a scattering microscope including a light source arranged to emit illuminating light and a light detector, the microscope being arranged to illuminate an object with the illuminating light and to detect light elastically scattered from the object with the light detector,

the method further comprising applying an electrical potential to the surface that affects the electrochemical properties of the object while imaging the object, the object being selected not to have a plasmon resonance frequency at the wavelengths of the illuminating light and at the applied electrical potential.

2. ~~A~~ The method according to claim 1, wherein an electric double layer forms at the object and the electrical potential to the surface affects the electrochemical properties of the electric double layer.

3. ~~A~~ The method according to claim 1 or 2, wherein the surface is a surface of a conductive material and the step of applying an electric potential to the surface comprises applying the potential to the conductive material.

4. ~~A~~ The method according to claim 3, wherein the conductive material is not a metal.

5. ~~A~~ The method according to claim 1 or 2, wherein the surface is a surface of a dielectric material and the step of applying an electric potential to the surface comprises applying the potential capacitively through the dielectric material.

6. ~~A~~ The method according to any one of the preceding claims, wherein the object further comprises at least one particle on the surface.

7. ~~A~~ The method according to claim 6, wherein the at least one particle has a mass of 5000 kDa or less.

8. ~~A~~ The method according to claim 6 or 7, wherein the at least one particle has a mass of 10 kDa or more.

9. ~~A~~ The method according to any one of claims 7 to 8, wherein the at least one particle has a scattering cross section with respect to the illuminating light of 10^{-17} m^2 or less.

10. ~~A~~ The method according to any one of claims 7 to 9, wherein the at least one particle has a scattering cross section with respect to the illuminating light of 10^{-26} m^2 or more.

11. ~~A~~ The method according to any one of the preceding claims, wherein the electrical potential has an amplitude that is constant over a response period of the electrochemical properties of the object that are affected thereby.

12. ~~A~~ The method according to any one of claims 1 to 10, wherein the electrical potential has an amplitude that changes over a period less than the response period of the electrochemical properties of the object that are affected thereby.

13. ~~A~~ The method according to claim ~~13~~ 12, wherein the ~~electrical potential has an~~ amplitude ~~that~~ is alternating over ~~a~~ the period less than the response period of the electrochemical properties of the object that are affected thereby.

14. ~~A~~ The method according to any one of the preceding claims, wherein the method comprises applying plural different electrical potentials to the surface, and detecting the light elastically scattered from a part of the object in respect of each electrical potential for characterisation of that part of the object and/or the surrounding environment.

15. ~~A~~ The method according to claim ~~15~~ 14, wherein further comprising determining ~~the~~ a degree of similarity of ~~the~~ profile of the light elastically scattered from ~~a~~ the part of the object in respect of each electrical potential with a reference profile.

16. ~~A~~ The method according to any one of the preceding claims, wherein the microscope is arranged so that the signal detected by the light detector is sensitive to the amplitude of the light elastically scattered from the object.

17. ~~A~~ The method according to any one of the preceding claims, wherein the microscope is an interferometric scattering microscope or a dark field scattering microscope.

18. ~~A~~ The method according to any one of the preceding claims, wherein the microscope is arranged to output a two-dimensional image of the object.

19. ~~A~~ The method according to any one of the preceding claims, wherein the illuminating light is ultraviolet light, visible light, or infrared light.

20. A scattering microscopy arrangement, the microscopy arrangement comprising:

an object comprising a surface;

a microscope including a light source arranged to emit illuminating light and a light detector, the microscope being arranged to illuminate the object with the illuminating light and to detect with the light detector light elastically scattered from the object; and

a voltage source arranged to apply an electrical potential to the surface that affects the electrochemical properties of the object while imaging the object, the object being selected not to have a plasmon resonance frequency at the wavelengths of the illuminating light and at the applied electrical potential.