## CLAIMS

What is claimed is:

1. A method for analysing a property of a cornea of an eye using terahertz (THz) radiation, the method comprising:

projecting a first THz wave onto a surface of the cornea;

detecting a first reflected wave being a reflection of the first THz wave reflected from the surface of the cornea;

deforming the cornea;

projecting a second THz wave onto the surface of the cornea after the deforming;

detecting a second reflected wave being a reflection of the second THz wave reflected from the surface of the cornea after the deforming; and

calculating the property of the cornea based on the first reflected wave and the second reflected wave.

2. The method according to Claim 1, further comprising: projecting a visible light to the surface of the cornea for less than 10 seconds to induce light stress to the cornea so as to deform the cornea.

3. The method according to Claim 2, further comprising: generating the visible light by a light-pressure device placed at a distance of about 1 or 2 cm in front of the eye.

4. The method according to any one of Claims 1 to 3, further comprising: puffing air to the surface of the cornea for less than 10 seconds to induce stress to the cornea so as to deform the cornea.

5. The method according to any one of Claims 2 to 4, wherein the step of calculating the property of the cornea comprises: calculating an elastic property, *c*, of the cornea based on:

$$\boldsymbol{F = cx + nx' + mx''} \quad (1),$$

wherein x is derived from a peak position change in the first reflected wave and the second reflected wave, F is the light stress induced by the visible light, n is a damping factor of the cornea, m is the mass of the cornea, x' is a first order derivative of x, and x" is a second order derivative of x, wherein F is calculated by:

$$\boldsymbol{F = (1 + \rho)\, E/C} \quad (2),$$

wherein $\rho$ is reflection coefficient of the surface of the cornea, *E* is incident energy flux of the visible light in $W/m^2$, and C is light speed in vacuum.

6. The method according to Claim 5, wherein the step of calculating the property of the cornea further comprises: calculating a rigidity property, *G*, of the cornea based on:

$$c = 2G(1 + v) \quad (3),$$

wherein c is the elastic property of the cornea, and *v* represents a Poisson's ratio of the cornea.

7. The method according to either of Claims 5 or 6, wherein the first reflected wave has a peak position at a first time t1, and the second reflected wave has a peak position at a second time t2, wherein x is calculated by:

$$x = C \times (t2 - t1) \quad (4),$$

wherein C is speed of light in a vacuum.

8. The method according to any one of Claims 2 to 7, further comprising:

synchronizing the visible light with the THz wave prior to detecting the second reflected wave.

9. The method according to any one of Claims 1 to 8, wherein the deforming forms a non-contact corneal deformation or an elastic corneal deformation.

10. A system for analysing a property of a cornea of an eye using terahertz (THz) radiation, the system comprising:

a device configured to deform the cornea;

a terahertz radiation measuring system comprising:

a terahertz radiation generator configured to project a first THz wave and a second THz wave respectively before and after the corneal deforming, and

a terahertz radiation detector configured to:

detect a first reflected wave being a reflection of the first THz wave reflected from the surface of the cornea, and

detect a second reflected wave being a reflection of the second THz wave reflected from the surface of the cornea after the deforming; and

a signal processing unit configured to communicate with the terahertz radiation measuring system to calculate the property of the cornea based on the first reflected wave and the second reflected wave.

11. The system according to Claim 10, wherein the device configured to deform the cornea is a light-pressure device configured to project a visible light to the surface of the cornea for less than 10 seconds to induce light stress to the cornea so as to deform the cornea.

12. The system according to either Claim 10 or Claim 11, wherein the visible light is a red light having a wavelength of 632nm generated by the light-pressure device at a power of 100μW.

13. The system according to any one of Claims 10 to 12, wherein the terahertz radiation generator comprises:

a femtosecond laser configured to generate the first THz wave and the second THz wave, and

a terahertz radiation signal emitter configured to emit the first THz wave and the second THz wave onto the surface of the cornea respectively before and after the deforming.

14. The system according to Claim 13, further comprising an optical system comprising two off-axis parabolic (OAP) mirrors,

wherein a first mirror of the two OAP mirrors is arranged in an optical path of the terahertz radiation generator and is configured to receive the first THz wave and the second THz wave emitted from the terahertz radiation signal emitter and reflect at least a portion of the first THz wave and the second THz wave to be projected onto the surface of the cornea; and

wherein a second mirror of the two OAP mirrors is arrange in a symmetrical position to the first mirror with respect to the eye and is configured to receive at least a portion of the first THz wave and the second THz wave reflected from the cornea to provide return beams respectively for the first THz wave and the second THz wave.

15. The system according to either Claim 13 or Claim 14, further comprising a THz wave detector arranged in an optical path of the return beams so as to receive the first reflected wave and the second reflected wave, respectively.

16. The system according to any one of Claims 10 to 15, wherein the signal processing unit is configured to calculate an elastic property, *c*, of the cornea based on:

$$\boldsymbol{F} = \boldsymbol{cx} \quad (1),$$

wherein x is derived from a peak position change in the first reflected wave and the second reflected wave, and F is the light stress induced by the visible light, wherein F is calculated by:

$$\boldsymbol{F} = (\mathbf{1} + \boldsymbol{\rho})\, \boldsymbol{E/C} \quad (2),$$

wherein $\rho$ is reflection coefficient of the surface of the cornea, *E* is incident energy flux of the visible light in $W/m^2$, and C is light speed in vacuum.

17. The system according to Claim 16, wherein the signal processing unit is further configured to calculate a rigidity property, *G*, of the cornea based on:

$$c = 2G(1 + v) \quad (3),$$

wherein c is the elastic property of the cornea, and *v* represents a Poisson's ratio of the cornea.

18. The system according to either Claim 16 or Claim 17, wherein the first reflected wave has a peak position at a first time t1, and the second reflected wave has a peak position at a second time t2, wherein x is calculated by:

$$x = C \times (t2 - t1) \quad (4),$$

wherein C is speed of light in a vacuum.

19. The system according to any one of Claims 11 to 18, wherein the light-pressure device is configured to be synchronized with the terahertz radiation generator prior to the detector detects the second reflected wave.

20. The system according to Claim 19, wherein the light-pressure device is synchronized with the terahertz radiation generator so as to project the visible light after the detector detects the first reflected wave.