To date, the art has failed to provide a solution to the above-mentioned drawbacks. It is therefore clear that it would be highly advantageous to provide a system free from the disadvantages described above.

Aspects of the present disclosure seek to provide an optical system that overcomes the drawbacks of the prior art.

Aspects of the present disclosure also seek to provide an optical system free from the need to use two moving optical elements.

Aspects of the present disclosure further seek to provide an optical imaging system which is compact, efficient and simple to ensemble.

Other objects and advantages of the invention will become apparent as the description proceeds.

Summary of the Invention

An aspect of the present disclosure provides an optical imaging system comprising a scanning mirror capable of bi-axial movement, which is essentially parallel to the ground wherefrom an image is to be acquired, and a total inner reflection (TIR) prism comprising two essentially triangular prisms separated by an optical coating, wherein one of said two triangular prisms is shaped as an isosceles triangle.

Another aspect of the present disclosure provides an image scanning apparatus, comprising:

(a) a bi-axial scanning mirror positioned substantially parallel to an image source surface, configured to reflect said image to an optical sensor; and

(b) a total inner reflection (TIR) prism module located between said surface and said mirror, comprising two essentially triangular prisms separated by an optical coating, wherein one of said two triangular prisms is shaped as an isosceles triangle.

There is also disclosed a total inner reflection (TIR) prism comprising two essentially triangular prisms separated by an optical coating or by a thin layer of air, wherein one of said two triangular prisms is shaped as an equilateral triangle. In one embodiment of the invention the TIR angle is of the order of 40°.

In one embodiment both essentially triangular prisms are made of the same material. Examples of suitable materials from which the prisms can be made include silicon, zinc chloride and calcium fluoride.

The optical coating can be made of the plurality of materials and for instance, is selected from among germanium, zinc sulfide, zinc sulfide cleartran, calcium fluoride, and magnesium fluoride. In the case in which no coating is required and air separates between the surfaces of the prisms, the thin layer of air has a thickness of between 0.1 and 0.3 mm.

There is also disclosed an optical imaging system comprising a bi-axial mirror and a TIR prism. The optical imaging system of the invention comprises a scanning mirror positioned above the TIR prism. Light leaving the TIR prism reaches an optical lenses assembly from which it is transmitted to a sensor. The scanning mirror is essentially parallel to the ground wherefrom an image is to be acquired.

In one embodiment the optical imaging system comprises mirrors suitable to transmit light to and from the optical lenses assembly.

In a further embodiment the system is adapted to simultaneously allow the passage of light of different wavelengths, selected from visible light, infrared light and laser.

In one embodiment it is allowed that the scanning mirror has an angle of no more than 20° from the scanning object, and wherein distortion resulting from said roll is corrected using image processing means. In this embodiment the optical imaging system further comprises

Claims

1. An optical imaging system comprising a scanning mirror capable of bi-axial movement, which is essentially parallel to the ground wherefrom an image is to be acquired, and a total inner reflection (TIR) prism comprising two essentially triangular prisms separated by an optical coating, wherein one of said two triangular prisms is shaped as an isosceles triangle.
2. The optical imaging system of claim 1, wherein the scanning mirror is positioned above the TIR prism.
3. The optical imaging system of claim 2, wherein light leaving the TIR prism reaches an optical lenses assembly from which it is transmitted to a sensor.
4. The optical imaging system of claim 3, comprising mirrors suitable to transmit light to and from the optical lenses assembly.
5. A system according to claim 1, which is adapted to simultaneously allow the passage of light of different wavelengths, selected from visible light, infrared light, and laser.
6. The optical imaging system of claim 1, wherein the scanning mirror has an angle of up to 20° from the scanning object, and wherein any distortion resulting from said angle is corrected using image processing means.
7. The optical imaging system of claim 1, further comprising image processing apparatus suitable to correct a distortion in the acquired image resulted from an angle of the scanning mirror.
8. An image scanning apparatus, comprising:

    (a) a bi-axial scanning mirror positioned substantially parallel to an image source surface, configured to reflect said image to an optical sensor; and

    (b) a total inner reflection (TIR) prism module located between said surface and said mirror, comprising two essentially triangular prisms separated by an optical

coating, wherein one of said two triangular prisms is shaped as an isosceles triangle.

9. A total inner reflection (TIR) prism for use in the system of claim 1, comprising two essentially triangular prisms separated by an optical coating, wherein one of said two triangular prisms is shaped as an isosceles triangle.
10. A TIR prism as claimed in claim 9, wherein both essentially triangular prisms are made of the same material.
11. A TIR prism as claimed in claim 10, wherein the material is silicon.
12. A TIR prism as claimed in claim 9, wherein the optical coating is selected from among germanium, zinc sulfide, zinc sulfide cleartran, calcium fluoride, and magnesium fluoride.
13. A TIR prism as claimed in claim 9, wherein the TIR angle is of the order of 40°.
14. A TIR prism as claimed in claim 1, wherein the thin layer has a thickness of between 0.1 and 0.3 mm.