

transparent electrode with a pitch shorter than any wavelength of visible light reduce the light reflection at the boundary between the air space and the transparent electrode.

[0108] As described above, the touch panel according to the present invention is provided with projections and depressions with a predetermined shape and a predetermined pattern formed with a pitch shorter than any wavelength of visible light, on the inner surface of the transparent electrode of at least one of the substrates in the following two ways. One arrangement is such that a plurality of projections are formed on the inner surface of at least one of the substrates with a substantially periodical pitch shorter than any wavelength of visible light, and the transparent electrode is formed over the inner surface of the substrate having the plurality of projections. The other arrangement is such that the transparent electrode provided with a plurality of projections having a predetermined shape and formed with a substantially periodical pitch shorter than any wavelength of visible light are formed on the surface of the flat substrates.

[0109] In addition, the touch panel according to the present invention is preferably arranged to have projections, each having a cross-sectional area parallel to the outer surface of the substrate which decreases in a stepwise or continuous manner from the bottom to the top of the projection.

[0110] The structures as described above reduce the light reflection and diffraction at the boundary between the air space and the transparent electrode, thereby providing a resistive contact-type touch panel or a electrostatic capacitive coupling-type touch panel both having high light transmittance.

[0111] While this invention has been described in conjunction with the specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, preferred embodiments of the invention as set forth herein are intended to be illustrative not limiting. There are changes that may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A touch panel, comprising:
 - a pair of substrates opposing each other and having a predetermined spacing therebetween;
 - a pair of transparent electrodes having a respectively predetermined pattern, each of the transparent electrodes being formed on an inner surface of each of the pair of substrates; and
 - a plurality of projections formed on the surface of at least one of the pair of transparent electrodes, the projections being formed to have a substantially periodical pitch that is shorter than any wavelength of visible light.
2. The touch panel according to claim 1, an air space being formed between the pair of transparent electrodes.
3. The touch panel according to claim 1, each of the projections becoming smaller from a bottom to a top thereof.

4. The touch panel according to claim 3, each of the projections becoming continuously smaller from the bottom to the top thereof.

5. The touch panel according to claim 3, each of the projections becoming smaller in a stepwise manner from the bottom to the top thereof.

6. The touch panel according to claim 3, each of the projections being formed as one of a truncated pyramid, a truncated cone, a pyramid and a cone.

7. The touch panel according to claim 1, the plurality of projections being arranged with a substantially periodical pitch in at least two directions.

8. The touch panel according to claim 1, the plurality of projections having a pitch ranging from 10 to 100 nm.

9. The touch panel according to claim 1, the plurality of projections being formed on surfaces of the pair of transparent electrodes.

10. The touch panel according to claim 9, the plurality of projections formed on the surface of one of the pair of transparent electrodes having the same pattern as that of the other transparent electrode.

11. The touch panel according to claim 9, the plurality of projections formed on the surface of one of the pair of transparent electrodes having a pattern different from that of the other transparent electrode.

12. The touch panel according to claim 1, each of the projections being formed by providing a projection on a surface of the substrate and the transparent electrode being formed over the projection of the substrate.

13. The touch panel according to claim 1, each of the projections being formed by providing a projection on the transparent electrode.

14. The touch panel according to claim 1, further comprising a plurality of spacers positioned between the pair of transparent electrodes that maintain the spacing between the pair of transparent electrodes.

15. The touch panel according to claim 1, the touch panel being at least one of an analog resistive contact type, a digital resistive contact type, and an electrostatic capacitive coupling type.

16. An electronic device including a touch panel, comprising:

- a lower substrate;
- a flexible input substrate opposing the lower substrate and having a predetermined spacing therebetween;
- a lower transparent electrode having a predetermined pattern formed on the inner surface of the lower substrate;
- an input transparent electrode having a predetermined pattern formed on an inner surface of the input substrate so as to oppose the lower transparent electrode with a predetermined spacing therebetween; and
- a plurality of projections formed on a surface of at least one of the lower transparent electrode and the input transparent electrode having a substantially periodical pitch that is shorter than any wavelength of visible light.

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