CLAIMS

1. An electrically-switchable flexible contact lens for conforming to an eye of a user, the lens comprising:

   a first liquid crystal cell for changing a focal power of the contact lens, and having a cell gap thickness between a first inner surface and a second inner surface,

   the first liquid crystal cell comprising a diffractive optical element for correcting the vision of a user,

   wherein the diffractive optical element is arranged to maintain the cell gap thickness by providing support at one or more locations within the cell; and

   the diffractive optical element comprises an inner portion and an outer portion, a maximum height of the diffractive optical element at the outer portion being greater than a maximum height of the diffractive optical element at the inner portion such that the diffractive optical element at the outer portion provides support to and spaces the first inner surface and the second inner surface at a greater distance at an outer region of the first liquid crystal cell than an inner region of the first liquid crystal cell.

2. The lens of claim 1, further comprising a perimeter spacer provided at the perimeter of the first liquid crystal cell for maintaining the cell gap thickness in addition to the diffractive optical element.
3. The lens of claim 1 or claim 2, wherein the first liquid crystal cell comprises a cholesteric liquid crystal, and the first liquid crystal cell is operable between a first, unswitched state and a second, switched state, wherein in one of the first and second states, the difference in the effective refractive index of the liquid crystal and the refractive index of the diffractive optical element is greater than in the other of the first and second states.
4. The lens of claim 3, wherein in the other of the first and second states, the difference in the effective refractive index of the liquid crystal and the refractive index of the diffractive optical element is approximately nil.
5. The lens of any preceding claim, wherein the diffractive optical element comprises an inner portion and an outer portion, a height of the diffractive optical element at the outer portion being greater than the height of the diffractive optical element at the inner portion.

6. The lens of any preceding claim, wherein at least a portion of the diffractive optical element is attached to the first inner surface and at least a portion of the diffractive optical element may be attached to the second inner surface.
7. The lens of any preceding claim, wherein at both 450nm and 700nm, the average refractive index of the liquid crystal is 0.80 to 1.20 times the refractive index of the diffractive optical element, the average refractive index being $n_{ave}=0.5(n_e+n_o)$, where n_e is the extraordinary refractive index and n_o is the ordinary refractive index.
8. The lens of claim 7, wherein at both 450nm and 700nm, said average refractive index of the liquid crystal is 0.95 to 1.05 times the refractive index of the diffractive optical element.
9. The lens of any preceding claim comprising a second liquid crystal cell for changing a focal power of the contact lens, the second liquid crystal cell optionally comprising the features of the first liquid crystal cell.
10. An electrically-switchable flexible contact lens for conforming to an eye of a user, the lens comprising:
    a first liquid crystal cell for changing a focal power of the contact lens, and having a cell gap thickness between a first inner surface and a second inner surface;
    the first liquid crystal cell comprising a diffractive optical element for correcting the vision of a user, the diffractive optical element comprising an inner portion and an outer portion, the maximum height of the diffractive optical element at the outer portion being from 1% to 20% greater than the maximum height of the diffractive optical element at the inner portion.
11. The lens of claim 10, wherein the height of the diffractive optical element at the outer portion is at least 3% greater and up to 15% greater than the height of the diffractive optical element at the inner portion.
12. The lens of claim 10 or claim 11, wherein the diffractive optical element comprises a plurality of peaks and troughs, and the outer portion comprises an outer peak, optionally the outermost peak.
13. The lens of any of claims 10 to 12, wherein the diffractive optical element extends over a chord length, r, the inner portion comprises the portion of diffractive optical element within a cord length of r/8 from a centre of the diffractive optical element, and the outer

portion comprises the portion of diffractive optical element having a chord length of from 3r/8 to r/2.

14. The lens of any of claims 11 to 13, wherein the liquid crystal comprises a cholesteric liquid crystal, and optionally, in an unswitched state, a director of the liquid crystal may be at an angle of no more than 5 degrees to the first and second inner surfaces, and in a switched stated, a director of the liquid crystal may be at an angle of at least 60 degrees, optionally at least 70 degrees, optionally at least 80 degrees and optionally at least 85 degrees to the first and second inner surfaces.
15. An electrically-switchable flexible contact lens for conforming to an eye of a user, the lens comprising:
    a first liquid crystal cell for changing a focal power of the contact lens, and having a cell gap thickness between a first inner surface and a second inner surface,
    the first liquid crystal cell comprising a diffractive optical element for correcting the vision of a user, and a cholesteric liquid crystal,
    the first liquid crystal cell being operable between a first, unswitched state and a second, switched state, wherein in the first state, the difference in the effective refractive index of the liquid crystal and the refractive index of the diffractive optical element is greater or lower than in the second state,
    wherein at both 450nm and 700nm, the average refractive index of the liquid crystal is 0.80 to 1.20 times the refractive index of the diffractive optical element, the average refractive index of the liquid crystal being n_{ave}, calculated thus $n_{ave}=0.5(n_e+n_o)$, where n_e is the extraordinary refractive index and n_o is the ordinary refractive index.
16. A lens according to claim 15, wherein at both 450nm and 700nm, said refractive index of the liquid crystal is from 0.90 to 1.10 times the refractive index of the diffractive optical element.
17. A lens according to claim 15 or claim 16, wherein at both 450nm and 700nm, said refractive index of the liquid crystal is from 0.95 to 1.05 times the refractive index of the diffractive optical element.
18. A lens according to any of claims 15 to 17, wherein the said refractive index of the liquid crystal at 500nm is 0.95 to 1.05 times the refractive index of the diffractive optical element.

19. An electrically-switchable flexible contact lens for conforming to an eye of a user, the lens comprising:

a first liquid crystal cell for changing a focal power of the contact lens, and having a cell gap thickness between a first inner surface and a second inner surface,

the first liquid crystal cell comprising a diffractive optical element for correcting the vision of a user, and cholesteric liquid crystal,

the first liquid crystal cell being operable between a first, unswitched state and a second, switched state, wherein in the first state, the difference in the effective refractive index of the liquid crystal and the refractive index of the diffractive optical element is less than in the second state,

wherein the refractive index of the diffractive optical element is at least 1.58 and no more than 1.66.

20. An electrically-switchable flexible contact lens for conforming to an eye of a user, the lens comprising:

a first liquid crystal cell for changing at least one optical characteristic of the contact lens, and having a cell gap thickness between a first inner surface and a second inner surface,

the first liquid crystal cell comprising a diffractive optical element for correcting the vision of a user, the diffractive optical element having a characteristic wavelength of operation, the characteristic wavelength of operation being from 450nm to 510nm;

the first liquid crystal cell comprising a cholesteric liquid crystal,

the first liquid crystal cell being operable between a first, unswitched state and a second, switched state, wherein in the first state, the difference in the effective refractive index of the liquid crystal and the refractive index of the diffractive optical element is greater or less than in the second state,

wherein there is a maximum in the transmission of the lens from 450 to 510nm when the liquid crystal cell is in the first or second state;

optionally wherein there is a maximum in the transmission of the lens from 460 to 490nm, optionally from 470 to 490nm and optionally 480nm, when the liquid crystal cell is in the first or second state.