Claims

1. An electrically-switchable liquid crystal cell (10) for changing a focal power of a contact lens, the liquid crystal cell comprising a diffractive optical element, the liquid crystal cell being switchable between an unmatched state and a matched state, wherein:
in the unmatched state, the effective refractive index of the liquid crystal (14) is different from the refractive index of the diffractive optical element; and
in the matched state, the effective refractive index of the liquid crystal matches the refractive index of the diffractive optical element, such that the diffractive optical element does not contribute a focal power for the contact lens, and
wherein the diffractive optical element comprises a plurality of diffraction blazes (12), each one of the plurality of diffraction blazes defining a peak (27) and a trough (28);
characterised in that:
more than one of the plurality of diffraction blazes has a trough with a rounded corner having a radius of curvature of between 5µm and 50µm; and
more than one of the plurality of diffraction blazes has a peak with a rounded corner having a radius of curvature of between 0.1µm and 20µm.

2. The liquid crystal cell of claim 1, wherein each one of the plurality of diffraction blazes has a trough with a rounded corner having a radius of curvature of between 5µm and 50µm.

3. The liquid crystal cell of claim 1 or claim 2, wherein each one of the plurality of diffraction blazes has a peak with a rounded corner having a radius of curvature of between 0.1µm and 20µm.

4. The liquid crystal cell of any preceding claim, wherein the plurality of diffraction blazes have an average height (35) of between 2.5µm and 3.8µm.

5. The liquid crystal cell of claim 4, wherein the plurality of diffraction blazes have an average height of between 3.7µm and 3.8µm.

6. The liquid crystal cell of any preceding claim, wherein the liquid crystal cell comprises a cholesteric liquid crystal.

7. An electrically-switchable contact lens (50) for correcting the vision of a user comprising the liquid crystal cell of any preceding claim.

8. The contact lens of claim 7, wherein the contact lens comprises a polymer lens body (55).

9. The contact lens of claim 7 or claim 8, wherein in the unmatched state the liquid crystal cell contributes a negative focal power to the lens such that in the unmatched state the resultant focal power of the lens is less positive than in the matched state.

10. A method of fabricating an electrically-switchable contact lens assembly for correcting the vision of a user, the method comprising:

providing first (300) and second contact lens polymer elements (370) each having respective front and rear surfaces, the front surface of the first contact lens polymer element including a recess (360);

inserting into the recess a liquid crystal cell (10) according to any one of claims 1 to 6; and

attaching the front surface (345) of the first polymer element to the rear surface of the second polymer element to form the contact lens assembly.

11. The method of claim 10 further comprising the steps of;

lathing (420) a first shape at the front surface of the first contact lens polymer element, the shape including the recess;

lathing (430) a second shape at the rear surface of the second contact lens polymer element, the second shape matching the first shape.

12. The method of claim 10 or claim 11 wherein the method further comprises, after the step of attaching (450), lathing (460) the front surface of the contact lens assembly.

13. The method of any one of claims 10 to 12 wherein the step of inserting a liquid crystal cell into the recess further comprises inserting optoelectronic power and control elements for selectively powering the liquid crystal cell.