CLAIMS

1. Use of one or more types of drugs in the manufacture of a pharmaceutical preparation for treating glaucoma, wherein the pharmaceutical preparation comprises a layer-by-layer thin film that is produced by alternately layering a polycation and a polyanion, and said one or more types of drugs loaded onto the layer-by-layer thin film, wherein said one or more types of drugs are to be instilled into an eye, and wherein the one or more types of drugs are drug(s) for treating glaucoma comprises prostaglandin(s).

2. The use according to Claim 1, wherein the polycation is chitosan.

3. The use according to Claim 1 or 2, wherein the polyanion is sodium alginate.

4. The use according to any one of Claims 1 to 3, wherein the layer-by-layer thin film has a film thickness of 5 nm to 500 nm without the drug.

5. The use according to any one of Claims 1 to 4, wherein the number of polycation and polyanion layers of the layer-by-layer thin film is 2 to 50.

6. The use according to any one of Claims 1 to 5, wherein the shape of the layer-by-layer thin film is a quadrangle, a circle, an oval, a doughnut shape or a ring shape.

7. The use according to any one of Claims 1 to 6, wherein the drug is loaded onto one surface of the layer-by-layer thin film.

8. The use according to any one of Claims 1 to 7, wherein the drug is loaded at an amount of 0.25 $\mu g/cm^2$ to 25 $\mu g/cm^2$.

9. The use according to any one of Claims 1-8, wherein the drug(s) for treating glaucoma further comprise at least one type of drug selected from a group consisting ofbeta blockers and carbonic anhydrase inhibitors.

10. The use according to any one of Claims 1-9, wherein the prostaglandin(s) is Latanoprost.

11. The use according to any one of Claims 1 to 10, wherein the layer-by-layer thin film further comprises a polyvinyl alcohol layer as a supporting film layer on at least one surface thereof.

12. The use according to Claim 11, comprising the supporting film layer on the surface opposite to the surface layered with the drug.

13. The use according to Claim 12, wherein the pharmaceutical preparation is applied to the eyeball by bringing the drug-layered surface into contact with the eye and then removing the supporting film on the opposite surface.

14. The use according to any one of Claims 7 to 13, further comprising, on the drug-layered surface, a drug release control film formed from polyvinyl acetate, polylactic acid, polyglycolic acid, polycaprolactone or a copolymer of any combination thereof.

15. The use according to any one of Claims 1 to 13, wherein after applying a drug control film formed from polyvinyl acetate, polylactic acid, polyglycolic acid, polycaprolactone or a copolymer of any combination thereof to the eye, the layer-by-layer thin film loaded with the drug is applied on said drug control film.

16. A pharmaceutical preparation suitable to be instilled into an eye comprising:

(1) a layer-by-layer thin film comprising 2 to 50 layers and having a total thickness of 5 nm to 500 nm as measured without a drug therein, said film

comprising alternate layers of a polycation and a polyanion, wherein each polycation layer is independently selected from the group consisting of chitosan, polylysine, polyarginine, polyhistidine, ionene, poly(quarterized pyridine), polymers of diallyldiakylammonium salt, and combinations thereof and each polyanion layer is independently selected from the group consisting of alginic acid, hyaluronic acid, chondroitin sulfate, polyglutamic acid, polymethacrylic acid, polyacrylic acid, polystyrene sulfonate and alkali metal salts thereof, and combinations thereof,

(2) prostaglandin(s) on top of the layer-by-layer thin film and/or between the layers of the layer-by-layer film, and

(3) a supporting film layer on the bottom of the layer-by-layer film.

17. The pharmaceutical preparation according to Claim 16, wherein the polycation is chitosan.

18. The pharmaceutical preparation according to Claim 16, wherein the polyanion is sodium alginate.

19. The pharmaceutical preparation according to Claim 16, wherein the layer-by-layer thin film has a film thickness of 15 nm to 100 nm without the drug.

20. The pharmaceutical preparation according to Claim 16, wherein the number of polycation and polyanion layers of the layer-by-layer thin film is 6 to 30.

21. The pharmaceutical preparation according to Claim 16, wherein the shape of the layer-by-layer thin film is a quadrangle, a circle, an oval, a doughnut shape or a ring shape.

22. The pharmaceutical preparation according to Claim 16, wherein the drug is loaded at an amount of 0.25 $\mu g/cm^2$ to 25 $\mu g/cm^2$.

23. The pharmaceutical preparation according to Claim 16, where the supporting film layer is selected from the group consisting of polyvinyl alcohol, starch, polyelectrolytes, polyethylene terephthalate, nylon, Teflon, and silk.

24. The pharmaceutical preparation according to Claim 16, wherein the prostaglandin(s) is Latanoprost.

25. The pharmaceutical preparation according to Claim 1, wherein the supporting film layer of the layer-by-layer is a polyvinyl alcohol.

26. The pharmaceutical preparation according to Claim 25, wherein the pharmaceutical preparation is applied to the eyeball by bringing the drug-layered surface into contact with the eye and then removing the supporting film on the opposite surface.

27. The pharmaceutical preparation according to Claim 16, further comprising a drug release control film formed from the polymer selected from the group consisting of polyvinyl acetate, polylactic acid, polyglycolic acid, polycaprolactone, and a copolymer of any combination thereof.

28. The pharmaceutical preparation according to Claim 16, wherein after applying a drug control film formed from the polymer selected from the group consisting of polyvinyl acetate, polylactic acid, polyglycolic acid, polycaprolactone, and a copolymer of any combination thereof to the eye, the layer-by-layer thin film loaded with the drug is applied on top of said drug control film and the support film is applied to the bottom of said drug control film.

29. The pharmaceutical preparation according to Claim 17, wherein the polyanion is sodium alginate.

30. The pharmaceutical preparation according to Claim 29, wherein the layer-by-layer thin film has a film thickness of 15 nm to 100 nm without the drug.

31. The pharmaceutical preparation according to Claim 1, wherein the prostaglandin(s) are substantially released from the pharmaceutical preparation between 3 and 7 days after application to the eye.

32. The pharmaceutical preparation according to Claim 30, wherein the number of polycation and polyanion layers of the layer-by-layer thin film is 6 to 30.

33. A pharmaceutical preparation suitable to be instilled into an eye comprising:

(1) a layer-by-layer thin film comprising 2 to 50 layers and having a total thickness of 5 nm to 500 nm as measured without a drug therein said film comprising alternate layers of a polycation and a polyanion, wherein each polycation layer is independently selected from the group consisting of chitosan, polylysine, polyarginine, polyhistidine, ionene, poly(quarterized pyridine), polymers of diallyldiakylammonium salt, and combinations thereof and each polyanion layer is independently selected from the group consisting of alginic acid, hyaluronic acid, chondroitin sulfate, polyglutamic acid, polymethacrylic acid, polyacrylic acid, polystyrene sulfonate and alkali metal salts thereof, and combinations thereof,

(2) prostaglandin(s) on top of the layer-by-layer thin film and/or between the layers of the layer-by-layer film, and

(3) a supporting film layer on the bottom of the layer-by-layer film selected from the group consisting of polyvinyl alcohol, starch, polyelectrolytes, polyethylene terephthalate, nylon, and Teflon,

wherein the prostaglandin(s) are substantially released from the pharmaceutical preparation between 3 and 7 days after application to the eye.

CLAIMS

1. A pharmaceutical preparation comprising a layer-by-layer thin film that is produced by alternately layering a polycation and a polyanion, and one or more types of drugs loaded onto the layer-by-layer thin film, which are to be instilled into an eye.

2. The pharmaceutical preparation according to Claim 1, wherein the polycation is chitosan.

3. The pharmaceutical preparation according to either one of Claims 1 and 2, wherein the polyanion is sodium alginate.

4. The pharmaceutical preparation according to any one of Claims 1 to 3, wherein the layer-by-layer thin film has a film thickness of 5 nm to 500 nm without the drug.

5. The pharmaceutical preparation according to any one of Claims 1 to 4, wherein the number of polycation and polyanion layers of the layer-by-layer thin film is 2 to 50.

6. The pharmaceutical preparation according to any one of Claims 1 to 5, wherein the shape of the layer-by-layer thin film is a quadrangle, a circle, an oval, a doughnut shape or a ring shape.

7. The pharmaceutical preparation according to any one of Claims 1 to 6, wherein the drug is loaded by being layered onto one surface of the layer-by-layer thin film.

8. The pharmaceutical preparation according to any one of Claims 1 to 7, wherein the drug is loaded at an amount of 0.25 $\mu g/cm^2$ to 25 $\mu g/cm^2$.

9. The pharmaceutical preparation according to any one of Claims 1 to 8, wherein the one or more types of drugs are one or more types of drugs for treating glaucoma.

10. The pharmaceutical preparation according to Claim 9, wherein the one or more types of drugs for treating glaucoma are at least one type of drug selected from a group consisting of prostaglandins, beta blockers and carbonic anhydrase inhibitors.

11. The pharmaceutical preparation according to Claim 10, wherein the one or more types of drugs for treating glaucoma are Latanoprost.

12. The pharmaceutical preparation according to any one of Claims 1 to 11, wherein the layer-by-layer thin film further comprises a polyvinyl alcohol layer as a supporting film layer on at least one surface thereof.

13. The pharmaceutical preparation according to Claim 12, comprising the supporting film layer on the surface opposite to the surface layered with the drug.

14. The pharmaceutical preparation according to Claim 13, wherein the pharmaceutical preparation is applied to the eyeball by bringing the drug-layered surface into contact with the eye and then removing the supporting film on the opposite surface.

15. The pharmaceutical preparation according to any one of Claims 7 to 14, further comprising, on the drug-layered surface, a drug release control film formed from polyvinyl acetate, polylactic acid, polyglycolic acid, polycaprolactone or a copolymer of any combination thereof.

16. The pharmaceutical preparation according to any one of Claims 1 to 14, wherein after applying a drug control film formed from polyvinyl acetate, polylactic acid, polyglycolic acid, polycaprolactone or a copolymer of any combination thereof to the eye, the layer-by-layer thin film loaded with the drug is applied on said drug control film.