

## HYDROPHILIC INTRAOCULAR LENS

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

This invention relates to implantable intraocular lenses, and particularly to an intraocular lens structure fabricated from an optically transparent hydrophilic material which may be rolled or bent into a compact configuration for packaging and delivery into the eye.

#### 2. Description of the Prior Art

We are unaware of any prior art relating specifically to implantable intraocular lens structures that are hydrophilic to the point that they are "soft" in the sense that the hydrated lens structure may be rolled or bent into a compact form for storage, retained in that form during delivery into the eye, and extended into its final form after delivery into the eye.

Accordingly, it is one of the important objects of the present invention to provide an implantable intraocular lens structure that is fabricated from a hydrophilic material that may be hydrated prior to delivery into the eye.

Another object of the invention is the provision of a hydrophilic intraocular lens structure that may be delivered into the eye in either a hydrated or dehydrated condition.

Still another object of the invention is the provision of an intraocular hydrophilic and hydrated lens structure that may be rolled or bent into a compact tubular form for delivery into the eye, with subsequent extension of the lens assembly into its normal form.

A still further object of the invention is the provision of a hydrated hydrophilic intraocular lens structure for implantation in the posterior or anterior chamber of the eye, which may be conformed prior to delivery into a conformation permitting its delivery through a smaller than usual opening in the order of about 3.5 mm as compared to the 6.5 mm opening usually required.

Yet another object of the invention is the provision of an implantable intraocular lens assembly, including the lens body and the supporting loops, which is packaged in a manner that enables the package to function as part of the delivery means.

Intraocular lens structures are by their very nature extremely small in size, delicate, susceptible to being damaged, and therefore difficult to package and store in a sterile condition. Accordingly, it is another object of the invention to provide a means for packaging intraocular lens assemblies of hydrated hydrophilic material which facilitates storing in a sterile hydrated condition and which facilitates delivery of the lens into the eye of the patient.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be apparent from the following description and the drawings. It is to be understood however that the invention is not limited to the embodiment illustrated and described since it may be embodied in various forms within the scope of the appended claims.

### SUMMARY OF THE INVENTION

In terms of broad inclusion, the hydrophilic intraocular lens assembly of the invention comprises an optically transparent lens body having a predetermined transverse dimension defining an outer periphery disposed about a central axis, and a plurality of support members, preferably in the form of crescentiform loops, extending from the periphery of the lens body and adapted to

support the lens assembly within the eye. The lens body is formed from a hydrophilic synthetic resin material formulated to accept hydration to the point that it will accommodate non-planar conformation of the lens body about an axis extending transverse to the central axis of the lens body for purposes of reducing its transverse dimension in at least one plane, thus facilitating storage in a sterile condition and container, and enabling delivery into the eye in such conformed condition. Enabling delivery of the hydrated hydrophilic lens assembly in a conformed reduced transverse dimension condition enables use of a significantly smaller incision or opening through which the conformed lens may be delivered into the eye, thus resulting in significantly less trauma to the patient. In one aspect of the invention, the hydrated hydrophilic lens assembly in conformed form is contained within a sterile tubular container sealed at both ends and enclosing the lens assembly in an appropriate saline solution. In another aspect of the invention, the hydrated hydrophilic lens assembly is enclosed within a tubular container open at both ends, with the tubular container contained within a saline solution-filled pouch. In still another aspect of the invention, the tubular member within which the hydrated hydrophilic lens assembly is conformed and retained forms part of a hypodermic-like instrument for insertion or delivery of the lens assembly into the eye.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary front elevational view showing the hydrophilic hydrated lens assembly in place in the capsular bag in the eye.

FIG. 2 is a fragmentary cross-sectional view through the optical axis of the eye and showing the lens assembly of the invention in place in the capsular bag.

FIG. 3 is a front elevational view of the lens assembly shown apart from the eye.

FIG. 4 is a side elevational view of the lens assembly shown apart from the eye.

FIG. 5 is a fragmentary cross-sectional view through the optical axis of the eye illustrating the lens of the invention mounted in the posterior chamber of the eye, but out of the capsular bag.

FIG. 6 is a fragmentary front elevational view illustrating the lens assembly of FIG. 5 mounted in the eye and supported out of the capsular bag.

FIG. 7 is a fragmentary cross-sectional view illustrating the lens assembly of the invention mounted in the anterior chamber of the eye.

FIG. 8 is a fragmentary front elevational view of the lens assembly mounted as illustrated in FIG. 7.

FIG. 9 is an elevational view illustrating the lens assembly of the invention sealed within a tubular container filled with an appropriate saline solution to hydrate the lens.

FIG. 10 is a plan view illustrating the lens assembly of the invention conformed within the interior of a tubular capsule open at both ends and which tubular capsule is in turn sealingly enclosed within a saline-filled pouch.

FIG. 11 is a vertical cross sectional view taken through the central axis of a hypodermic-like device which functions to contain the lens assembly of the invention in conformed condition and which assists in delivery of the lens assembly into the eye.