

SUMMARY OF THE INVENTIONDISCLOSURE

In an aspect, there is provided an ocular implant, comprising:

a diffractive multifocal intraocular lens (IOL) operable to provide a distance, a near and an intermediate focus, the diffractive multifocal IOL having a thin edge operable to support a smaller incision, wherein the diffractive multifocal IOL comprises a bifocal diffractive region providing the distance and near foci, a center-distance refractive region and an outer refractive region, the phase of the outer refractive region matching the phase of the bifocal diffractive region and the phase of the center-distance refractive region shifted out of phase from the bifocal diffractive region by between $1/8$ and $1/16$ of a wave to phase-shift optical energy such that constructive interference occurs at both the distance and intermediate foci; and

a plurality of haptics coupled to the diffractive multifocal IOL operable to position the diffractive multifocal IOL within an eye.

Embodiments of the present disclosure provide an improved diffractive multifocal design for ocular implant. This ocular implant includes a diffractive multifocal intraocular lens (IOL) and a number of haptics. The diffractive multifocal IOL passes optical energy in distance, intermediate and near conditions. The haptics mechanically couple to the diffractive multifocal IOL in order to position and secure the diffractive multifocal IOL within the eye. The diffractive multifocal IOL may include both a diffractive region and a refractive region. The diffractive region may be a central region or optic zone of the lens that includes concentric steps of gradually varying step heights in order to allocate energy based on lighting conditions and activity in order to create a full range of quality vision, i.e. near, intermediate and distant for the patient. This allows conditions where the natural lens of the eye must be replaced to be corrected.

Other embodiments of the present disclosure provide a method to correct for visual impairment of aphakia. In one embodiment this involves removing a natural lens from an eye when the lens may be diseased or damaged through accident. Next a diffractive multifocal IOL may be inserted within the eye and then secured and positioned with a number of haptics. The diffractive region of the diffractive multifocal IOL may simultaneously pass optical energy to distant, intermediate and near focal points in bright optical conditions while the outer refractive region may pass optical energy to distance vision in dim optical conditions. Yet another embodiment of the present disclosure provides a method to correct visual impairment. This method involves passing optical energy to the retina wherein the optical energy may be imaged. This optical energy is passed with a diffractive multifocal IOL typically located within the eye and used to replace the natural lens. The diffractive multifocal IOL passes optical energy in distance, intermediate and near conditions. The diffractive multifocal IOL can have a central diffractive region and an outer refractive region.