IN-VIVO MODIFICATION OF INTRAOCULAR LENSES USING FEMTOSECOND LASERS

The ability to ablate/process within transparent materials is of growing interest in the biomedical field, especially in the field of ophthalmology (eye) research. Concerns over the transformation of both physical and chemical properties of the ablated material from within the eye, and the effects on the eye itself have raised numerous studies and research. As we are aware of, femtosecond lasers are now used in refractive corneal surgery to reshape the cornea, and perform corneal surgery.

In this research, we look at the use of femtosecond laser for in-situ ophthalmology and eye surgery. We investigate into the use of femtosecond lasers to modify the artificial intraocular lenses (IOLs) in the human eye. As IOLs are routinely used in cataract surgery today, these PMMA, silicon or acrylic polymer lenses which possesses a certain degree of refractive power, are implanted within the human eye to mimic the human crystalline lens. In fact, each year the Singapore National Eye Centre (SNEC) used about 8000 IOLs implants.

But the fact that IOLs have fixed power proved to be a disadvantage. With the use of IOLs, often, a residual short-sightedness (myopia), long-sightedness (hyperopia) or astigmatism occurs despite complicated biometry calculations. Thus at times, patients will still require corrective spectacles. With this research, the Singapore Eye Research Institute (SERI), together with the Precision Engineering and Nanotechnology (PEN) Centre of School of MPE, aims to modify the power of the IOL within the human eye in an in-vivo situation using the femtosecond laser to address this residual refractive error problem.