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Intraocular lenses controlled by two-photon processes

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The implantation of polymeric intraocular lenses (IOL) is very much increasing due to an ageing society. The IOL today is mostly a passive device, but by means of two-photon absorption photochemistry it will turn into an active device, opening a new area of post-implantation treatments.
The treatment of secondary cataract as well as the refraction tuning of implanted IOLs are the two applications we currently follow most.
Two-photon photochemistry enables to trigger chemical reactions by light behind an absorbing barrier, in our case the cornea. Only light within the visible spectrum passes through the cornea, but UV light is absorbed. Particular chemical structures, like the cyclobutan-motive, show an interesting two-photon absorption, i.e. a reaction which normally requires UV-light can be triggered with high intensities of visible light. This may be used for release of a drug from an implanted IOL e.g. for treating secondary cataract. Further the same photochemistry may be employed to tune the refractive properties of an implanted IOL in a range of +/- 2 dpt.