

Polymer GRIN

Manufacturing process for plastic optical components/gradient lenses

Invention

Classical lenses are made of an optical material with a certain refractive index and curvature. These two characteristics determine the lens's focal length. An alternative design is achieved by varying the refractive index radially and using a curved surface. Scientists from Rhein-Waal university have developed a new manufacturing process for gradient lenses. It achieves optical element refractive power not with curvature, but by such means as radially varying the lens material refractive index. The lens can then take the simple geometric shape of a cylinder with parallel surfaces.

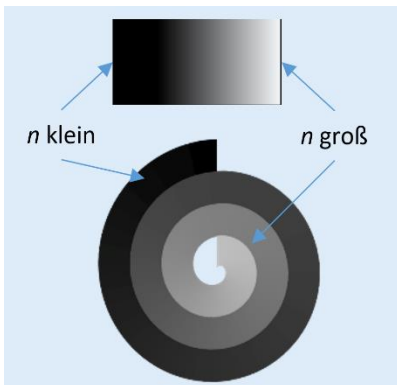


Figure 1

So far, such lenses have been manufactured from special pieces of glass with ion exchange in immersion baths so that the diffusion from the edge creates a gradient in the material. This process is painstaking and expensive.

The invention now allows cylinder lenses to be manufactured from plastic, with the cylinder wrapped from film with index gradients along its length that then translate to a radial progression. A tempering step then produces continuous material properties. The film gradient can be achieved with co-extrusion of two different polymers with a temporally variable mixer.

Commercial Opportunities

The following points are important for GRIN lens manufacture:

- Thinner or flatter lens of the same focal length
- Lower aberrations (coma, chromatic aberration)
- Unique, affordable manufacturing process for GRIN with large aperture
- Film extrusion followed by wrapping

Current Status

A patent application has been submitted to the German Patent and Trade Mark Office. Within the priority year, PCT and U.S. applications were also submitted. We are offering interested companies the opportunity to license and refine the technology in collaboration with the inventors and Rhine-Waal University.

Relevant Publications

Publications are being planned.

An invention of Rhine-Waal University.

Competitive Advantages

- Affordable manufacturing process
- Thinner/flatter lenses
- Low aberrations

Technology Readiness Level

1 2 3 4 5 6 7 8 9

Technology validated in relevant environment

Industries

- Eyewear industry
- Lenses
- Lens manufacturers

Ref. No.

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