

# Design and fabrication of freeform holographic optical elements

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Holographic optical elements (HOEs) can be broadly divided into photopolymer HOEs and liquid-crystal HOEs. Photopolymer HOEs have a relatively small refractive index modulation and therefore exhibits a strong selectivity on the wavelength and incident angle. Liquid-crystal HOEs which are also named as liquid-crystal polarization optical elements (POEs) have a greater refractive index modulation, and therefore have broader angular and spectral bandwidth compared to photopolymer HOEs. Both PPHOEs and PBOEs have great potential applications in augmented reality (AR) display. The current design and fabrication of both photopolymer HOEs and liquid-crystal POEs are relatively simple, because planar and spherical wavefronts used to fabricate the photopolymer HOEs and the alignment layer of liquid-crystal POEs provide very limited degrees of design freedom. Consequently, both aberration correction capability and diffraction efficiency of the traditional photopolymer HOEs and liquid-crystal POEs are very limited. In this talk, we employ freeform wavefronts to fabricate photopolymer HOEs and liquid-crystal POEs, which yields high-performance freeform photopolymer HOEs and freeform liquid-crystal POEs.



## **Short Bio:**

**Rengmao Wu** is a professor of optical engineering at Zhejiang University, China. His research interests include freeform optics, optical system design, display, and computational imaging. He is the SPIE Community Champion Award recipient and the 2021 Optica Kevin P.

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Thompson Optical Design Innovator Award recipient. He also serves as the associate editor of Optics Express.