
Holographic polymer materials for near-to-eye AR display

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Augmented Reality (AR) technology enriches human-computer interaction by seamlessly blending virtual information with the real world. Implemented across various sectors, including healthcare, warehousing and logistics, industrial integration, safety and security, and military applications, AR is poised to revolutionize daily experiences. Near-to-eye AR display devices, designed for everyday wear, are anticipated to supersede smartphones as the forefront of next-generation mobile computing. Current trends in AR display devices are geared towards more compact, lightweight wearable glasses. However, challenges such as subpar display quality and prohibitive manufacturing costs impede widespread consumer adoption. Holographic volume grating-based waveguide technology stands as a promising solution to these issues. At the kernel of this technology is the material used, making the development of high-performance holographic polymer materials a pressing need. In this paper, we unveil our latest advancements in holographic polymer dispersed liquid crystals (HPDLC) and holographic photopolymer materials. These materials demonstrate significant refractive index modulations of 0.10 for HPDLC and 0.045 for holographic photopolymers, enabling larger fields of view (FoV) and higher light efficiency for AR displays. Moreover, we have managed to maintain haze below 1% for HPDLC and 2% for holographic photopolymers, enhancing display clarity. A groundbreaking improvement in material photosensitivity heralds a new level of efficiency in producing holographic volume grating-based waveguides, promising to accelerate the path towards inexpensive, high-quality wearable AR devices.



Short Bio:

Mingli Ni received his PhD in polymer chemistry and physics from Huazhong University of Science and Technology, China. He is a senior engineer and the director of near-to-eye display research institute in National Virtual Reality Innovation Center, Nanchang Virtual Reality Research Co., Ltd., China