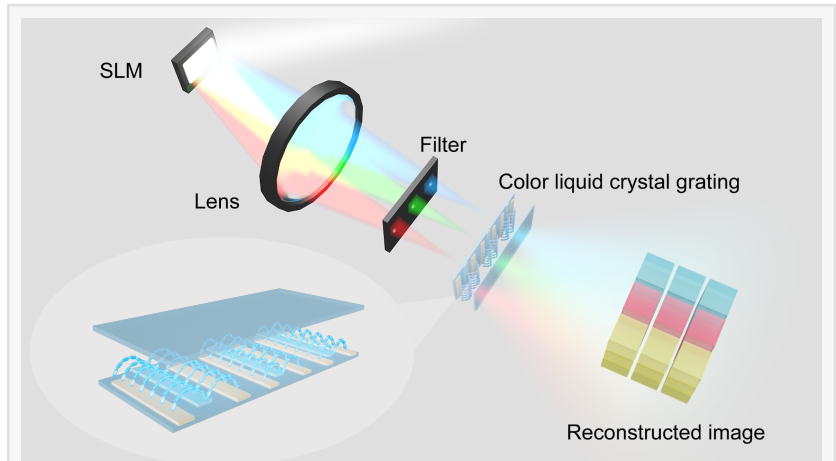


Color liquid crystal grating based color holographic 3D display system with large viewing angle

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/EINPresswire.com/ -- Holographic [3D display](#) with large viewing angle and vivid color display is highly desirable for numerous applications ranging from medical treatment to industry. Towards this goal, scientists in China proposed a novel holographic display system based on color liquid crystal grating, which achieves chromatic-aberration-free color display with a large viewing angle of 50.12° . The technique paves the way for superior holographic 3D display and is expected to advance the application of holographic 3D display.



Concept of the proposed system. The local enlarged image shows the specific structure of the color liquid crystal grating.

Holographic display technology provides an ultimate solution for real 3D display and has great potential in augmented reality and virtual reality. However, the color and viewing angle of holographic 3D display mainly depend on the wavelength of the laser and the pixel size of the current spatial light modulator. Inevitable color differences and narrow viewing angle in conventional systems seriously affect the holographic display effect and hinder the application of holographic 3D display in many fields.

In a new paper (<https://doi.org/10.1038/s41377-023-01375-0>) published in Light: Science & Application, a team of scientists, led by Professor Qiong-Hua Wang from Beihang University, China, and co-workers have developed a color liquid crystal grating based 3D display system with a large viewing angle. The proposed system shows a color viewing angle of 50.12° , without any chromatic aberration.

Beihang researchers utilized a specially designed color liquid crystal grating with the same diffraction angle for incident RGB light to enlarge the viewing angle through secondary diffraction. The color liquid crystal grating has three different pitch regions in one liquid crystal

cell, corresponding to incident light with different wavelengths, respectively. Additionally, a chromatic aberration-free hologram generation method is proposed to cooperate with color liquid crystal grating to achieve a large viewing angle color display. Using the proposed system, 3D color objects can be vividly reconstructed without chromatic aberration and viewed from a large viewing angle.

The reported system solves the problems of small viewing angle and serious chromatic aberration in the traditional holographic 3D display system, which has a decent display effect and broad application prospects in medical, industrial and other fields.

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