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Holography Technology, Photorefractive Optics, Optical Information processing & 3D display

We are "Information Photonics Lab" (Figure 1) of the Electrophysics Department, NCTU. The core focus is to build up the enabling technologies related to the holographic technologies and materials for information storage and processing, particularly in volume holography, including three major parts:

(a) Volume holographic materials and applications: We explore new and better materials for volume holographic recording. One example is to investigate a doped photopolymer material, which consists of the strong host polymer matrix and ultrasensitive doped elements. It provides the negligible photoinduced shrinkage (less than 10^{-5}) and different functionalities for volume holographic applications. (Figure 2).

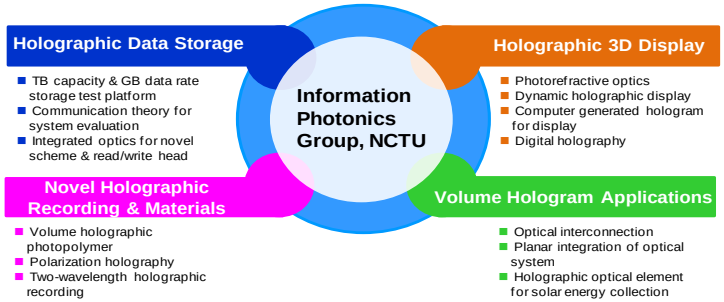


Figure 1

(b) Photorefractive optics and 3D display: In the past few years, our lab has led an interdisciplinary R&D team including the crystal growth Lab in Bulgarian Academy of Science and the Liquid Crystal Lab of NCTU, and achieved several major technical milestones toward our ultimate goal of submicro-pixel resolution for holographic 3D display, including ultrafast sillenite-type photorefractive crystal and new hybrid organic/inorganic device (Figure 3).

(c) Holographic data storage and applications: Volume holographic data storage has received intensive attention in recent years because of its potential to provide ultra-high density (> 100 Gb/in2) and ultra-high data rate (> 100 Gb/sec). Many fundamental issues have to be investigated before this novel technology can be practical. We developed a precision test-bed (Figure 4), to perform a comprehensive investigation on fundamental characteristics and applications of holographic information systems. That consists of principles, design, fabrications, and characterization on holographic materials, devices, and modules.

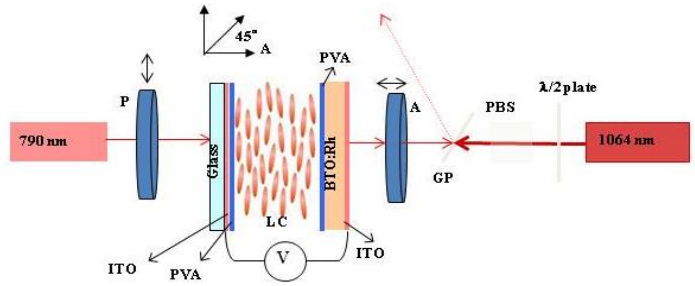
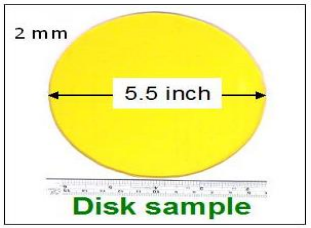


Figure 2



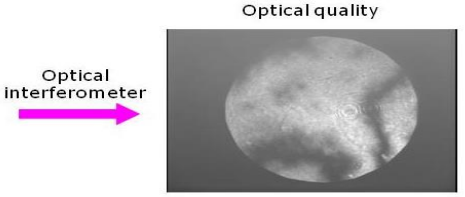


Figure 3

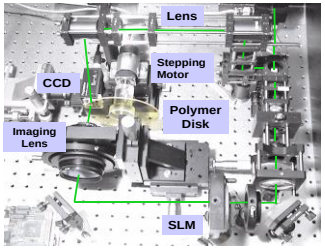


Figure 4