

# High Density Photochromic Optical Data Storage Using Dye-Doped minute spheres

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We have fabricated a new optical storage media using minute spheres arranged on surface relief grating (SRG). By using minute spheres as recording bits, we can limit recordable regions by sphere size, since one minute sphere becomes one recording bit. We can realize high resolute reconstruction in the plane direction. We made surface relief structures on a polymer thin film, and tried to perform diffusion arrangement and adsorptive fixation of minute spheres on it. The stability of arranged spheres was confirmed for heating and washing. Furthermore, we tried dipping method for more simple arranging minute spheres on a large area of the substrate and have made a monolayer sample of the spheres. We have also succeeded in doping the recordable dyes in minute spheres.

We used a reflect-typed confocal optical system in readout optical system of minute optical data storage. Using a reflect-typed confocal optical system, we have read out shape signals from minute spheres in high-resolution. The shape signals from minute spheres are utilized as a clock signal in recording and readout. We measured the confocal reflected signal from a single minute sphere. We have obtained a shape signal of about 500 nm in width from the minute sphere of 478nm in diameter. We have been measured the change in confocal reflection of about 10 % in before and after recording from single minute sphere doped with rhodamine or spiropyran as a recording dye. We can also readout recorded data bits of the minute spheres array doped with rhodamine B in the sufficient contrast.