

근접장을 이용한 고밀도 광 메모리에 관한 연구  
: 광 픽업을 위한 미세 개구 행렬의 제작과 시험

*Enhanced density of optical data storage  
using near-field concept*

*: Fabrication and test of nanometric aperture array*

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We have tried to enhance the density of the near-field optical memory and to improve the recording/readout speed. The current optical memory has the limitation in both density and speed. This barrier due to the far-field nature can be overcome by the use of the near-field<sup>(1)</sup>. The optical data storage density can be increased by reducing the size of the nanometric aperture where the near-field is obtained. To fabricate the aperture in precise dimension, we applied the orientation-dependent / anisotropic etching property of crystal Si often employed in the field of MEMS<sup>(2)</sup>. And so we fabricated the 10×10 aperture array. This array will be also the indispensable part for speeding up. One will see the possibility of the multi-tracking pickup in the phase changing type memory through this array<sup>(3)</sup>. This aperture array will be expected to write the bit-mark whose size is about 100nm. We will show the recent result obtained.

### 1. Fabrication of apertures

There are basically two ways to etch silicon: dry and wet chemical etching. In micromachining, the control of the shape of the structure made with silicon is accomplished by anisotropic wet etching through mask openings. The etching geometry and the gross reaction formula<sup>(4)</sup> are as follows(Fig.1). 10% KOH was used for orientation-dependent etching of single-crystal silicon. Etch condition was to be 37 hours 45 minutes at 20°C. The result is shown in Fig. 2.

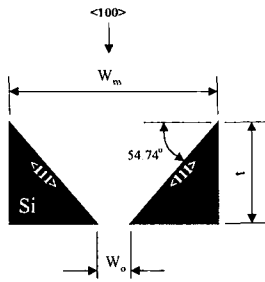


Fig. 1

- geometry :  $W_o = W_m + \sqrt{2} t$
- gross reaction :  $Si + 2OH^- + 2H_2O \rightarrow SiO_2(OH)_2^{2-} + 2H_2$



Fig. 2

SEM image of  $10 \times 10$  aperture array

## 2. Beam profile and writing results

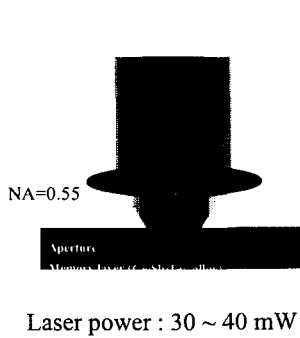


Fig.3 brief setup picture

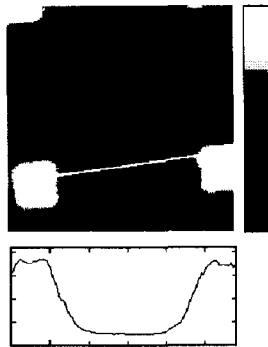


Fig.4 beam profile

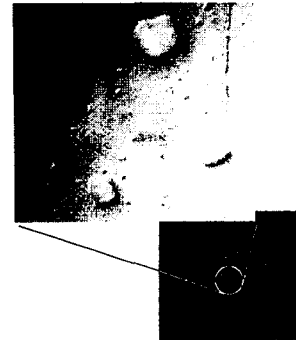


Fig.5 writing image

## 3. References

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