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PROGRESS IN 3D OPTICAL DATA STORAGE WITH FLUORESCENT PHOTOSENSITIVE GLASS-CERAMICS

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Measurements of writing sensitivity in three-dimensions for fluorescent photosensitive glass-ceramics are used to assess their storage density in a discrete bit recording system. Dynamic experiments indicate a density limits of 12GB/cm^2 equivalent with 1400GB for a CD standard disc.

Key words: Data storage; 3D; optics; fluorescent photosensitive glass-ceramics.

1. INTRODUCTION

The goal of the new technology in optical data storage is to overcome the density limitations of conventional 2D data storage systems by using 3D recording. Among 3D technologies, virtual multilayers writing into fluorescent photosensitive glass-ceramics [1-2] has many advantages [3].

2. RESULTS

This report presents the performance of fluorescent photosensitive glass-ceramics measured with a dynamic tester designed specifically for this new media. Low power laser pulses write on these materials. The numerical aperture of focusing lens was 0.6, which allows writing bits as small as 0.5 μm in diameter (Fig. 1) specific for DVD standards.

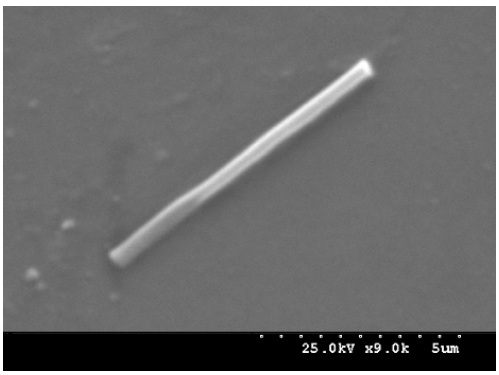

Figure 1. SEM image of a recorded line.

The densities achieved with this system provides an experimental basis for projecting performance of new optical data storage systems. The recording, readout processes for the data are not affected by layers recorded nearby. Experimental measurements sustain the recording of 300 layers with DVD capacity for each layer (4.7 GB).That means 12GB/cm^2 equivalent with 1400GB for a CD standard disc.In Fig. 2 there is the image of a layer recorded at 100μm beneath disc surface. Readout signal of recorded lines is presented in Fig. 3.

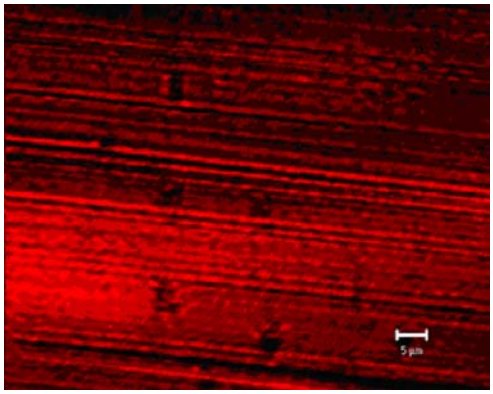

Figure 2. Confocal microscope image of lines recorded at 100μm beneath disc surface.

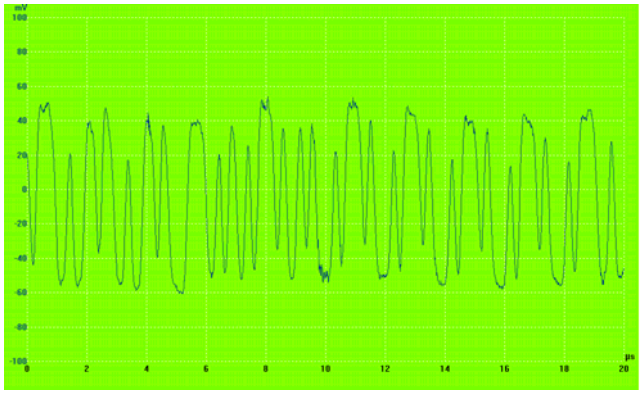

Figure 3. Oscilloscope traces of recorded lines.

3. CONCLUSIONS

A new media has been developed. Large operating tolerance on writing laser power makes this material a good candidate for systems capable of high data storage densities. The technology is attractive for data storage applications requiring high capacities, high temperature stability and long shelf and archiving time.

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