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## 5D data storage by using direct Laser writing in silver containing glass

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- **Title**

5D Data Storage by using Direct Laser Writing in Silver containing Glass

- **Author(s) information**

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- **250-word abstract for technical review**

We have studied 5D Data storage using Direct Laser Writing (DLW) in a commercial silver-containing glass. We implemented 5D (3D for XYZ + 2D for intensity and orientation) with the femtosecond laser induced photochemistry of fluorescent silver species. Intensity was encoded over 16 levels by adjusting the Irradiance of the femtosecond laser with an AOM device. In order to realize the orientation dimension, we created an elliptical pattern by anamorphic focusing using the SLM device and we adjusted the orientation to 16 levels.

In the writing process, two images, both for intensity and orientation encoding, were embedded in a single image. The two original images have then been retrieved through the reading process. Both the intensity image and the orientation image have 100 \* 100 pixels and calibration matrix has 16 \* 16 pixels (number of intensity level \* number of orientation level). In the reading process, we used confocal microscope to access both intensity and orientation information.

The retrieving fidelity of the orientation level is higher than that of the intensity level. Residual errors come from our system (Shape of the laser beam irradiated to the SLM mask, incompleteness of the sample surface, non-uniformity of the signal intensity to the ROI of the microscope, etc.).

Such 5D optical data storage in silver-containing glasses allows for perennial high-density information storage, as long as temperature remains well below the glass transition temperature.

- **100-word summary for the program**

We have studied 5D Data storage using Direct Laser Writing (DLW) in a silver-containing glass. We implemented 5D (3D for XYZ + 2D for orientation, intensity) with the femtosecond laser induced photochemistry of fluorescent silver species. In the writing process, two images, both for intensity and orientation encoding, were embedded in a single image. The two original images have then been retrieved through the reading process. Such 5D optical data storage in silver-containing glasses allows for perennial high-density information storage, as long as temperature remains well below the glass transition temperature.

- **Keywords used in search for your paper (optional)**

Direct Laser Writing (DLW), 5D Data Storage, Superman memory, fluorescent silver clusters, silver-containing phosphate glasses, femtosecond laser.