

2D/3D Optical Data Storage in Polymers with Nonlinear Microscopy

Denis Gindre

University of Angers, MOLTECH-Anjou UMR CNRS 6200, Angers, France,

denis.gindre@univ-angers.fr

We present our recent contribution related to the 2/3D optical data storage by means of nonlinear processes inducing localized chemical modifications on photoresponsive organic thin films [1]. These methods are supported by the spatial selectivity of two-photon absorption (TPA) applied to several photoresponsive materials in order to induce specific localized effects (cross-linking of coumarins[2], isomerisation of azobenzenes, cyclisation ...) allowing a writing of information inside the material into very small volumes ($< 1 \mu\text{m}^3$).

The readout process is based on the detection of the photoinduced modulation of nonlinear response from the irradiated areas. Images from these materials were either obtained by detection of different levels of second harmonic generation (SHG) signals with a scanning nonlinear microscope or by fluorescence induced by two-photon excitation (TPEF) respectively. As a consequence of the photodimerization of coumarin units in the polymer, a modification of the local SHG response on the irradiated voxels is observed and a recording of a greyscale image could be achieved [3].



[1] Gindre, D.; Sallé, M. et al. (2011), Patent PCT WO2011124840 A1.

[2] Iliopoulos, K.; Krupka, O.; Gindre, D.; Sallé, M.; *J. Am. Chem. Soc.* **2010**, *132*, 14343.

[3] Gindre, D.; Iliopoulos, K.; Krupka, O.; Champigny, E.; Morille, Y. and Sallé, M. *Opt. Lett.* **2013**, *38*, 4636.