

High security DOVE with nano-optical elements

The new optical technology for synthesizing of high-security DOVE - called LIDOGRAMA, was presented in previous publications.

This technology allows synthesizing of:

- High-contrast nanographic of objects, described in vector format with resolution not less than 36 000 dpi (Figures 1, 2, 3, 4, 5, 6);

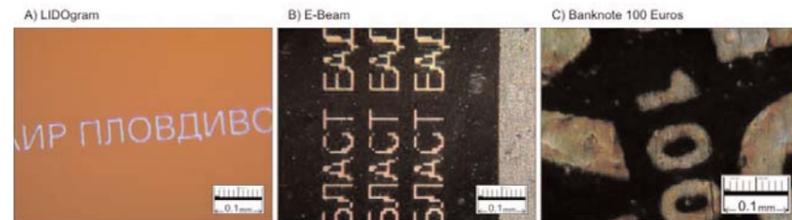


Fig 1
Microtext

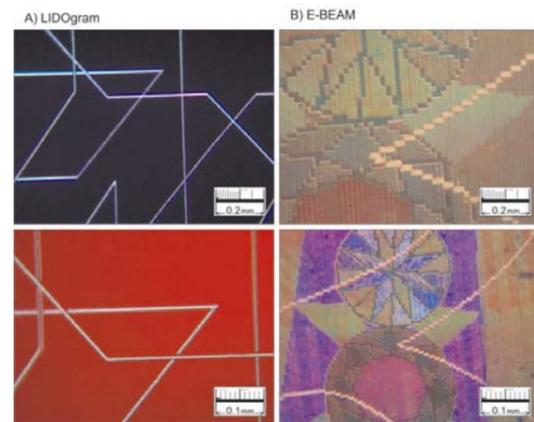


Fig. 3
Thin lines - 0.005 mm



Fig. 4
Micro drawings



Fig. 5
Micro drawings that is seen with 10x magnifier



Fig. 2
Black nano-text with size of characters from 10 to 3 μm

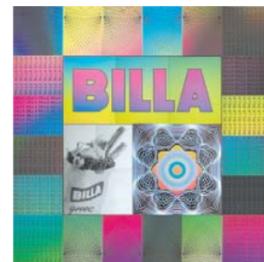


Fig. 6
Holographic raster image with grey scale graduation

Colour object

RGB holographic object

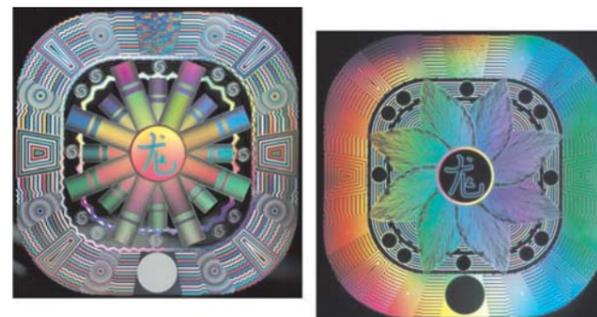


Fig. 7
High-contrast multiple flip effect images (multi-channel images)



Fig. 8
Synthesized white holographic flat objects

The new step in the development of the LIDOGRAM technology is the making of a new software and improved technological process that allow calculation and synthesizing of nano-optical elements. We named the whole this modification "LIDOGram ray".

In LIDOGram ray they were created algorithms for calculation of nano optical structures that restore hidden images of objects in white and coherent light. By these optical elements the reflected light energy is concentrated in chosen in advance dots and those increasing multiply the signal-noise ratio in the observed images. The use of the beforehand chosen image resolution allows selection of optimal parameters for embossing on materials with different plastic properties. That means that it is possible to choose the form of the relief in the optical element in order to optimize the process of embossing.

The most interesting quality of the LIDOGram ray is the possibility to calculate and synthesize nano-optical raster with small dispersion. By lighting this type of raster with white directed light in the viewer's eye or on screen is formed an achromatic (white) image staying far away from the DOVE's plane - look at Fig. 9 where the word "BAS" is the image that is seen after the DOVE is exposed to white directed light.



Fig 9
Nano-optical raster synthesized with the technology LIDOGram ray.
By exposing the raster to white directed light in the viewer's eye is formed achromatic (white) image of an object (the word BAS) in enough big distance from the plane of DOVE.

This new type of hidden image could be powerful instrument for authenticity control of the DOVE and greatly increases its security and protective characteristics. The development of this new approach for synthesizing of diffraction images could lead to the successful implementation of a machine-readable information into the DOVE.

Usually by the rainbow holograms the hidden image exposed to laser light is visualized in first order. LIDOGram ray allows the synthesized image to be viewed in zero order and to be the only one (look at the logo and the word Lidogram on Fig. 10).



Fig 10

By using the LIDOGram ray the generated images could be both virtual and real. The technology allows to achieve different depth of the image up to tenth of centimeters, depending on the material on which the holograms are applied.