- **Scientific summary stage III:**

In the third stage, the Coordinator INFLPR obtained thin films and structures via MAPLE, in the experimental conditions selected in the second stage:

1. Azoderivatives (O3 ') synthesized by partner P1
2. Composite films O3 ' with polymer (PAA) in various mass ratios

The thin films deposited by MAPLE were investigated in INFLPR for surface morphology and chemical composition. Optical properties were also studied and the films were optimized.

In the LIFT experiments, the donor layer thickness plays a critical role and it requires careful control in order to achieve optimal transfer and printing of pixels. The pixels are well cut, but their structure is not continuous. Thus, for a 150 nm thick film the transferred structure consists only of fragments that give shape to the pixels. The debris are not limited to the 350 x 350 μm^2 irradiated zone, but are also ejected outside this area. The development of embedded optoelectronic circuits comprising surface mount devices promises to make possible levels of miniaturization well beyond the capabilities of current manufacturing techniques (A. Matei, C. Constantinescu, et. al, Applied Surface Science, doi:10.1016/j.apsusc.2014.11.022).

In stage three, partner 1 (INOE) investigated the performance and selection of the best experimental entrapping process parameters for newly synthesized organic material (organic compound O3) in silico - phosphate matrix by sol - gel.

The next sol gel synthesis parameters were considered:

- Preparation conditions (precursor molar ratio (TEOS and H3PO4) / H2O / C2H5OH, hydrolysis / condensation reaction time, organic compound concentration)
- Substrate type (glass and ITO / glass)
- Spin coating deposition parameters (rotation speed, deposition time, pouring way of the sol on the substrate)
- Termal treatment parameters (temperature, termal treatment program)

The thin films deposited by sol gel method were investigated by spectroscopy (FTIR, Fluorescence, Raman, UV VIS), SHG analysis, AFM and spectroellipsometry.

In stage three, partner 2 (SITEX 45 SRL) received from the other partners thin azoderivatives films obtained in optimal experimental conditions in order to be integrated in the processed optical switches.

The results of the alternative processing experiments in standard conventional technology and in non-conventional technology for manufacturing of micro / optoelectronic components technology confirm the great ability of the innovative azoderivative materials with two-photon absorption for applications in optoelectronics.

The development of application through precision micromachining of azoderivative compounds demonstrate that these new materials be integrated in optical switch devices with high speed for optoelectronics and optical communications.

The results obtained so far and the successful completion of optoelectronic components with long manufacturing cycle for the optoswitch designed and developed confirm the great potential of the new materials developed within the project frame to build new products with superior performance for applications in optoelectronics, photonics, and optical communications components devices with high speed.

The results were disseminated through three ISI published papers, 12 presentations at international conferences/ roundtables, workshops, symposiums and a dissertation at the Faculty of Physics, University of Bucharest.