Laser based methods for biological compounds and polymer patterning

Valentina Carmen Dinca

National Institute for Lasers, Plasma and Radiation Physics, Bucharest, Romania

ABSTRACT

The precise positioning of biological compounds and polymers is an essential part of their use in technological applications, and their controlled assembly, positioning, and integration into microsystems is a problem of considerable current interest. The methodology used for this is limited, and the development of laser techniques for transferring different materials on solid surfaces in a controlled manner has attracted much attention during the last few years.

Among these, laser-induced forward transfer (LIFT) and matrix-assisted pulsed laser evaporation (MAPLE) has been used for printing or depositing micron-sized patterns, respectively thin films from biological compounds and polymers.

The design, structural characterization and quantification of biological compounds patterns/microarray or thin films obtained by LIFT and MAPLE were studied by varying various parameters (i.e. laser pulse length, surface chemistry, target composition and characteristics, the use of a Dynamic Release Layer, etc.).

Examples of combining laser based method (LIFT, MAPLE) with specific chemistry (thiol chemistry) and properties of biological compounds (e.g. biotin, avidin, titin, HRP, peptides) and/or polymers (e.g. ORMOCER, Polyisobutilene, Polyethylenimine) for obtaining well defined micropatterns in a controlled manner are provided.