Characterization of polymeric and biological films obtained by matrix assisted pulsed laser evaporation (MAPLE)

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ABSTRACT

The development of laser techniques for depositing different materials on solid surfaces in a controlled manner has attracted great attention during the last few years.
Conventional pulsed laser deposition (PLD) using ultraviolet (UV) laser sources cannot be applied to most soft materials, since irradiation by UV light induces a substantial decomposition of the target molecules. Soft inorganic, organic, polymer and biomaterial films can be produced by an alternative technique, known as matrix assisted pulsed laser evaporation (MAPLE) which has the potential to create thin films of controlled thickness at the nanometer scale (10–500 nm) on surfaces of various substrates.
Here, we show that thin polymeric (Polyethilenimine (PEI), Polyisobutylene (PIB) and Polyepichlorhydrine (PECH)) and protein (lactoferrin) films can be obtained by the MAPLE process.
The analysis of the films demonstrates that high quality films can be obtained and that a significant part of the polymer/biological compound (i.e. proteins) molecules are transferred to the substrate without decomposition and with a preservation of the bioactivity.
These results highlight the expanding role of matrix assisted pulsed laser evaporation process in biomaterials, drug delivery, and tissue engineering.