CHAPTER 5

Laser Based Processing of Biomaterials

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Summary

Laser deposition of polymers and biomaterials present an interesting case study for the use of lasers because of the high power or short penetration depth of pulsed lasers; these qualities are usually incommensurate with their non-destructive processing. Recently, researchers have found unique combinations of lasers and material systems that lend themselves to the deposition of novel biomaterial thin films, composites, and three dimensional constructs. In some cases, pulsed laser deposition is satisfactory for some drug delivery coatings, in other scenarios the polymer or biomaterial can be frozen in a solvent matrix and softly desorbed as a controlled chemo-selective polymer film, and lastly techniques have been developed to use computer-aided designs and micro-laser systems to forward transfer biomaterials into two-dimensional heterogeneous patterns. In all cases, the initial goal is to replicate the starting material in the thin film, but additionally laser processing will allow deposition control unachievable by conventional techniques. This chapter presents a review of novel laser processing of polymers and biomaterials for applications ranging from sensors and passivation coatings to tissue constructs and medical devices.

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