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Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters.
Nota di contenuto	Introduction -- Pyro-electric effect and polymers self-assembling -- Pyro-Electrohydrodynamic printing and multi jets Dispenser -- Pyro-EHD lithography, fabrication and employment of 3D microstructures -- High resolution patterning of biomaterials for tissue engineering -- Biodegradable microneedles for transdermal drug delivery -- Conclusions and perspectives.
Sommario/riassunto	The thesis presents an original and smart way to manipulate liquid and polymeric materials using a “pyro-fluidic platform” which exploits the pyro-electric effect activated onto a ferroelectric crystal. It describes a great variety of functionalities of the pyro-electrohydrodynamic platform, such as droplet self-assembling and dispensing, for manipulating multiphase liquids at the micro- and nanoscale. The thesis demonstrates the feasibility of non-contact self-assembling of liquids in plane (1D) using a micro engineered crystal, improving the

dispensing capability and the smart transfer of material between two different planes (2D) and controlling and fabricating three-dimensional structures (3D). The thesis present the fabrication of highly integrated and automated ‘lab-on-a-chip’ systems based on microfluidics. The pyro-platform presented herein offers the great advantage of enabling the actuation of liquids in contact with a polar dielectric crystal through an electrode-less configuration. The simplicity and flexibility of the method for fabricating 3D polymer microstructures shows the great potential of the pyro-platform functionalities, exploitable in many fields, from optics to biosensing. In particular, this thesis reports the fabrication of optically active elements, such as nanodroplets, microlenses and microstructures, which have many potential applications in photonics. The capability for manipulating the samples of interest in a touch-less modality is very attractive for biological and chemical assays. Besides controlling cell growth and fate, smart micro-elements could deliver optical stimuli from and to cells monitoring their growth in real time, opening interesting perspectives for the realization of optically active scaffolds made of nanoengineered functional elements, thus paving the way to fascinating Optogenesis Studies.