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Multiple Scenarios for Soft Matter Manipulation based on LiNbO₃ Crystals

Thursday, 8 September 2022 09:00 (35 minutes)

Manipulation of soft matter, especially at micro and nanoscale, is of primary importance in many fields of science and technology. Novel scenarios have been opened in recent years by using platforms based on LiNbO₃ crystals. Interestingly, the multifaced intrinsic properties of such ferroelectric crystal has driven the development of novel concepts in exploiting pyroelectric or photorefractive effects for manipulate liquids or polymers. Moreover, further developments have been achieved in manipulating or driving biological matter such as cells and bacteria on platforms based on LiNbO₃ crystals thus opening the route to a new set of tools in biotechnologies. The next challenging step forward to achieve in such intriguing scientific arena will points toward the realization of intelligent platforms able to integrate multipurpose functionalities for manipulating soft matter at multiscale. Here we present an array of assay of demonstrations to show several handling modalities of liquid sample such as, self-assembling, liquid drop ejection, robotic-like multiplexed liquid manipulation, electrowetting-like tasks, pyro-EHD drop printing, pyro-EHD-spinning, and different example of microfabrication processes based on pyro-EHD polymer drawing, and more. Furthermore, a couple of examples of applications in using platforms based on LiNbO₃ crystals for study and address live biological matters will also presented and discussed at the aim to revealing innovative scenarios in which such kind of platforms based on substrate-cell interaction based on electric surface charges could be a exploited in the future for driving and/or regulate biological processes.

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Primary author: Prof. FERRARO, Pietro (Istituto di Scienze Applicate e Sistemi Intelligenti –CNR (Italy))

Co-authors: MICCIO, Lisa (Istituto di Scienze Applicate e Sistemi Intelligenti –CNR (Italy)); COPPOLA, Sara (Istituto di Scienze Applicate e Sistemi Intelligenti –CNR (Italy)); VESPINI, Veronica (Istituto di Scienze Applicate e Sistemi Intelligenti –CNR (Italy)); GRILLI, Simonetta (Istituto di Scienze Applicate e Sistemi Intelligenti –CNR (Italy))

Presenter: Prof. FERRARO, Pietro (Istituto di Scienze Applicate e Sistemi Intelligenti –CNR (Italy))

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