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Abstract

Magnetic beads handling by droplet microfluidics for biological applications

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Abstract:
Microfluidics devices are currently undergoing an exponential development and are starting to take a major place in the new generation of biological and medical analysis instruments. In fact, the typical sample volume can be reduced down to one million-fold compare with conventional approaches, and a high level of spatiotemporal control is possible, facilitating highly parallelized assays with drastically increased throughput and reduced cost.

For biological applications, the compartmentalization of assays is one key element to obtain independent and large data sets. In daily life biological laboratory, this is achieved by distributing different solutions in independent wells of a microtiter plate. An improvement of this compartmentalization can be easily achieved through droplet microfluidics devices. Here, two (or more) immiscible fluids are put into contact by specific geometrical channel networks to produce a controlled emulsion of droplets of one phase dispersed in the other. For biological applications, the emulsions are typically composed by aqueous-phase droplets dispersed in oil mixed with specific surfactants. Nowadays, several operations can be achieved with droplets, including high-throughput generation, merging, splitting, and sorting, which are typically applied to homogeneous (liquid/liquid) reactions. However, during the past few years, heterogeneous (liquid/solid) reactions, involving micrometric magnetic particles have experienced an increasing diffusion

in many biological protocols. In fact, the particles are typically used as solid support for purification, enrichment and high-sensitivity detection applications. In this talk, I will present how these micro-magnetic particles can be integrated and exploited in droplet microfluidics devices, discussing the state from both technological and application point of views.

Biography:
Davide Ferraro was awarded a PhD degree in Materials Science and Engineering from the University of Padua in 2013. After 4 years post-doc at the Institut Curie in Paris (France), he is now researcher at the Physics and Astronomy department of the University of Padua. He has published more than 30 papers in peer-reviewed journal and reputed journals. .

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