Bubbles, Drops and Vesicles: The Charm of Microfluidics

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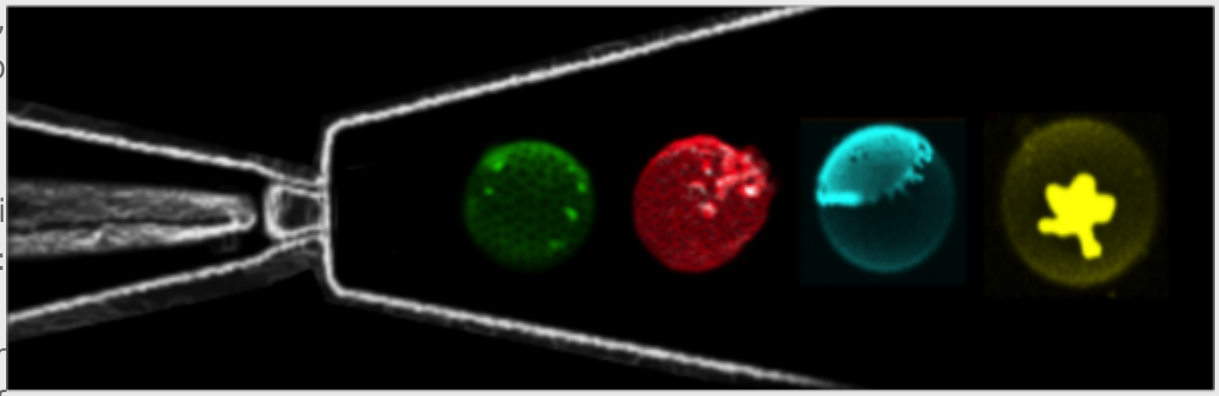

When: Friday, February 02, (2018), 12:00.

Place: Department of Theoretical Condensed Matter Physics, Faculty of Science, Module 5, Seminar Room (5th Floor).

Speaker: Laura R. Arriaga, Universidad Complutense de Madrid, Spain.

The exquisite control over the flow of fluids afforded by microfluidic technologies enables the design of materials with precise properties. In this talk, I will show some examples. For example, flowing air into a liquid enables the production of foams made bubble--by--bubble; these can be solidified, resulting in controlled porous architectures [1]. Moreover, flowing a liquid into a second immiscible liquid enables the production of emulsions consisting of drops; their surface can be used as a one--pot system for synthesis, assembly and display of functional membrane proteins [2]. Furthermore, the incorporation of additional fluids enables the generation of controlled multiple emulsions; these afford many more possibilities for creating new materials. Among them, water--in--perfluorocarbon--in--water double emulsion droplets can be used for acoustic--triggered release of payloads [3]. In addition, water--in--oil--in-- water double emulsion droplets with very thin shells can be used as templates for vesicle formation [4]. These vesicles are monodisperse in size, have uniform composition and a high encapsulation efficiency as the flow stream of the fluid that forms the vesicle core is completely separated from the outer fluid [5] these overcomes the limitations of vesicles produced by conventional methods. Despite bubbles and drops are all produced by microfluidics one at a time, I will also show that scaling up is possible [6].

References

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