DELEGATE BIOGRAPHY

Australia - Delegate Biography

First Name	Tuncay
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Tuncay Alan received his PhD in Theoretical and Applied Mechanics from Cornell University in 2007. He then worked as a researcher at Delft Institute of Microsystems and Nanoelectronics (DIMES) in the Netherlands and London Centre for Nanotechnology (LCN) in UK prior to joining Monash in 2010. His research focuses on microelectromechanical systems, microfluidics, nanofabrication and experimental nanomechanics.

Tuncay's work is centred in the development of micro and nano scale devices and can be grouped under three headings: 1) ultra-sensitive sensors and actuators (for implantable/wearable biomedical devices), 2) nano-scale fluid handling systems (for hand-held diagnostics) and 3) mechanical characterisation of cells.

Tuncay's Talk

Lab in a droplet: On-demand digital microfluidics for on-chip bioscreening

This talk will present versatile piezo-actuated nanosystems for the automated formation, merging and manipulation of picoliter water-in-oil droplets. Digital (droplet based) microfluidic systems offer a versatile platform for biochemical studies, where the reaction of biological targets can be tested against reagents. Using miniaturised systems allows for extreme precision, significant reduction in sample volumes and reaction times, along with single-cell analysis capabilities, promising massive increases in throughput as well as reductions in costs. Well established continuous droplet production methods are useful for a number of applications where a single reaction type (between one sample and one reagent) occurs. However, to fully exploit the promises offered by droplet based systems it is necessary to handle a combination of reactions between an array of samples and several distinct reagents, on-demand, on a single chip.

High frequency surface acoustic waves (SAW) offer this on-demand capability. SAW can be generated by an AC signal applied to a set of electrodes patterned on a piezoelectric substrate. We show that a pulse focused at the water-oil interface can produce a single picoliter-scale water-in-oil droplet on-demand in milliseconds. The system can be employed to localise subsequent droplets for on–demand merging of their constituents. And, very importantly, the droplet size and the formation time can be accurately controlled.