



INVITATION TO PHOTON SCIENCE SEMINAR

Date: Tuesday, 7 Nov 2023

Time: 14h00

Location: WBGB/019

You are cordially invited to the following Extraordinary Photon Science Seminar:

Acoustofluidic techniques for ultrafast mixing and

on-demand droplet injection

by Prof. Tuncay Alan

Monash University, Australia

Abstract:

In this presentation, I will discuss acoustically-driven microfluidic techniques for precise nanomaterial synthesis and on-demand sample injection into analytical instruments.

The first part of my talk will concentrate on ultrafast high-throughput mixers, which are used to synthesize a wide range of organic and inorganic nanomaterials, from nanodrugs and protein particles to nucleic acids and perovskites. In all these cases, the reacting solutions are rapidly and effectively homogenised at time scales as short as 2 milliseconds, preventing any fluctuations in the reagent concentrations. This mechanical process enables control over size and uniformity of the formed nanoparticles while significantly reducing by-products without altering reaction conditions.

The second part of my talk will cover recent developments in droplet-on-demand techniques. I will demonstrate how acoustic actuation can be used to eject individual nanolitre volume samples at tuneable rates ranging from 1-140 Hz; as well as aerosol based approaches in which the droplet diameter can be dialled on-demand.

Tuncay Alan is Senior Lecturer at the Department of Mechanical and Aerospace Engineering at Monash University. His research focuses on the interaction between micro/nanoscale resonators with flowing fluid media. He is currently leading the Dynamic Micro Devices Laboratory, which combines nanofabrication, acoustics and fluid mechanics for controlled synthesis of materials and personalized drug delivery. Tuncay received his PhD from Cornell University, Ithaca, New York. He held postdoctoral positions at Delft University of Technology (Netherlands) and University College London (UK). He is currently a visiting faculty at ETH Zurich and a senior fellow at Collegium Helveticum.

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