



Tide Microfluidics is a high-tech start-up company with strong ties to the University of Twente, specialising in the development and production of microbubbles of accurately defined sizes. We were founded in 2011 to further develop and commercialise proprietary microfluidic technology for the production of microparticles.

Tide is based on the Business and Science park opposite the University of Twente, with both laboratory and office facilities. We believe in innovative development in a collaborative and conscientious working environment. To find out more please visit: www.tidemicrofluidics.com

Acoustic characterization of ultrasound contrast-agent microbubbles

Tide Microfluidics is a company focussed on translating its proprietary microfluidic technology into a user-friendly ultrasound contrast agent (UCA) production system at the bedside of the patient. Such new production system enables mobile and real time monitoring, such as in the field or the emergency room, or even for during operating procedures.

UCA consist of dispersions of microbubbles with diameters between 2 and 6 μm , thus they have sizes smaller than red blood cells. These microbubbles remain in the blood pool, after an intravenous injection into the human body, and circulate through the (micro)vascular system enabling perfusion imaging of organs during ultrasound procedures. A key aspect of UCA for successful imaging is their calibrated size distribution and an efficient interaction between the microbubbles and the ultrasound wave. Such interaction is determined by acoustic characterization measurements.

The assignment

The objective of the assignment is to set up an experimental environment for acoustic characterization of UCA microbubbles. The outcome of this work will be used in the context of product optimization and of quality testing.

Tasks

The following key activities will be covered during this assignment:

- Develop/validate a dedicated acoustics test bench for measuring microbubble-specific properties (attenuation, scattering, nonlinear oscillations, ...)
- Implement software tools in Matlab for controlling measurement equipment (pulse/receiver, arbitrary waveform generator, oscilloscope)
- Collect, process and interpret experimental data
- Compare measurement data with modelling, using linearized Rayleigh-Plesset kind-of equations, for determining visco-elastic shell parameters.

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The Medical UltraSound Imaging Center, MUSIC, is an international expertise center on functional and quantitative imaging using ultrasound for medical applications. MUSIC develops ultrasound-based techniques for improved diagnosis, guiding intervention and monitoring treatment from idea to initial clinical application. The close collaboration with clinicians on one side and commercial partners on the other side warrants that these techniques not only address important clinical problems, but also facilitate commercialization of the developed solutions.

Focus is on strain and flow estimation to assess the functionality of the cardiovascular system, muscles of the extremities, and urinary tract. These techniques are also used to improve early detection of cancer in breast and the neck. Additionally, there is a wealth of expertise on quantitative echography. Quantitative analysis of the echogram is used to stage liver fibrosis, to assess liver fat content, to improve tumor detection in breast, to quantify lung ripeness in fetuses, and to guide interventional procedures. Most projects are carried out in close collaboration with industry (Samsung Medison, Siemens, Philips Medical Systems, Esaote Europe, Visualsonics).

We offer different projects for internships of 3, 6 and 9 months. Depending on your skills (signal processing, fundamental acoustics, experimental or clinical expertise, electrical or mechanical engineering) and the clinical application of interest, a suitable project will be formulated. Adequate supervision is guaranteed by the presence of 5 postdocs and more than 10 PhD candidates.

More info at

<http://music.radboudimaging.nl/index.php/Home>