

# So You Want a Sound Diagnosis?

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Contrast ultrasound diagnostic techniques have been used in healthcare for the past few decades. In recent years much more has been asked of the technology to meet the 21st century challenges not only in their traditional diagnostic uses but also for future therapeutic applications. In order to continue to improve the diagnostic and therapeutic capabilities of the medical ultrasound industry new techniques and technologies were required. These had to overcome cavitation affects, increase their ability to create uniform structures and continue to decrease the size of the structure. Companies large and small are starting to respond to these challenges.



***Tide Microfluidics products are protected by a combination of process and product patents that have been embodied in their micro bubble generator equipment.***

Here we look at one of the more unique approaches to these challenges brought by the Dutch firm Tide Microfluidics. It has been able to produce ultra small ultra uniform spherical structures for a variety of industrial settings, with an emphasis on medical applications. These ultra small spherical structures are made with a variety of bubble encapsulation materials. Tide Microfluidics products are protected by a combination of process and product patents that have been embodied in their micro bubble generator equipment. The results of Tide Microfluidics new technologies are bubbles that resonate instead of cavitate, which are created by smaller specifically encapsulated uniform micro spheres which greatly increase diagnostic contrast, speed and efficiency.

Tide Microfluidics has done this through its patented processes, which focus on multiple encapsulating materials tailored to the selected gas for a specific application. The ability to produce not only the micro spheres but also the micro bubble generating equipment allows the company great latitude and flexibility in application selection. This capability has allowed it to add specific functionality around the micro bubble by including nanoparticles, biomarkers and traditional chemical activation sites such as lipids.

It is this ability that allows Tide Microfluidics great latitude in gas selection and encapsulated surface functionality traits. This allows Tide Microfluidics and indeed the ultrasonic industry to move towards a future based not only on diagnostics but, even more importantly, on therapeutics. This is in line with the doctrine "Detection is not enough" adopted by many industrialised nations in the EU, North and South America, Asia and Australasia as well as developing nations in Africa and other regions in the world to govern healthcare practice. These increased specific functional improvements in ultrasonic techniques allow not only for improved contrast diagnostics but improved ultrasonic therapeutics capability and the monitoring on not only ultrasonic based therapies but other pharmaceutical therapeutics as well. We follow with an example.

>> Continued on page 50



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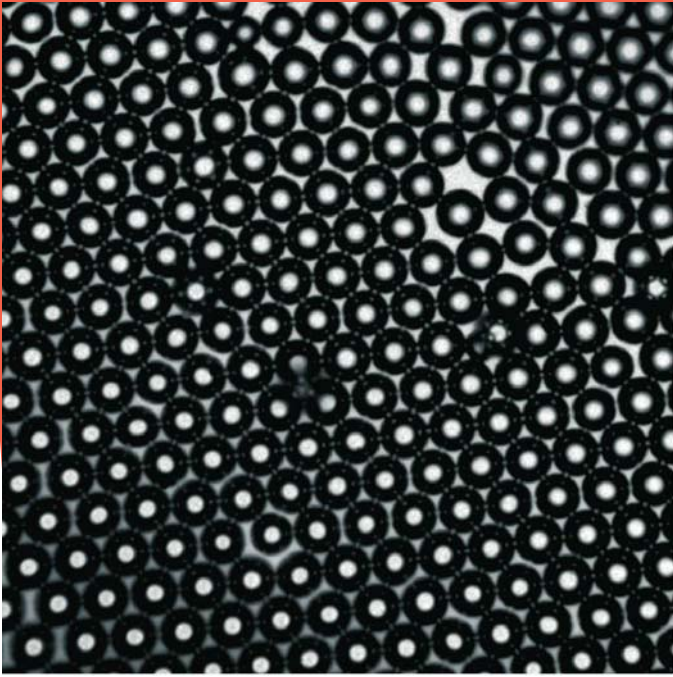
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<< **Figure 1: Uniform phospholipid encapsulated air bubbles (Courtesy Tide Microfluidics BV).** >>

In figure 1 we provide uniform phospholipids encapsulated air bubbles generated by Tide Microfluidics that combines all of the advantages that will be found in the next generation of ultrasound based products. Here these micro spheres are smaller than red blood cells of less than 10 microns which vary by less than 5% in diameter regardless of the number of micro spheres individually generated by the machines. A generator that creates these structures has a rate of 1 million spheres per second. Not only is the generation rate of the micro bubbles much more than an order of magnitude greater than industry standard micro fluidic based practice, but it is also more than an order of magnitude more uniform. These are the characteristics that are the foundations for an industrial standard manufacturing practice.

The Tide Microfluidics generator is small and portable, allowing for diagnostic generation not only at the industrial manufacturer location but, more importantly, at point of care of an individual patient. It allows for continuous monitoring at a smaller controlled dosage, which can eliminate unwanted side effects. The Tide Microfluidics generator is one of the first of the next generation ultrasound medical products.

**Tide Microfluidics**  
[www.tidemicrofluidics.com](http://www.tidemicrofluidics.com)



**Dr. Wim van Hoeve** is the founder of Tide Microfluidics with primary responsibility for the day-to-day work. He has worked for many years within the field both as a PhD student and more recently as an accomplished researcher

focusing purely on this technical innovation. He has the belief in this product which is underscored by the fact he has established this company, Tide Microfluidics, to bring the technology successfully to the medical market by applying his experience and knowledge, developed through collaborations within the network set-up around the technique.

**Bernd Vinke, MSc**, works for Tide Microfluidics as Business Development Manager after 11 years in international corporate banking. He has been involved in patent negotiations and fundraising since 1,5 years as an independent business advisor. He has worked for Tide Microfluidics since 1st of February 2014.



**Dr. Steven Walsh** is a Distinguished professor at UNM where also holds the Regents professor at UNM's Anderson School of Management. He also is the institute professor for entrepreneurial renewal of industry at the University of Twente. He has many business service awards including the lifetime achievement award for Commercialization of Micro and Nano Technology Firms from MANCEF. He has also been named as a Tech All Star from the State of New Mexico Economic Development Department and has been recognised by Albuquerque the Magazine as a leader in service to the economic community. He is a serial entrepreneur that has helped attract millions of dollars in venture capital to these firms.