

# World leading microsphere specialist

Emultech is the world leader in microfluidic emulsification particle production. The patented microfluidic system produces monodisperse microspheres in a continuous system that brings you quickly from feasibility to clinical scale without risk. Since the start Emultech has fine-tuned the production to make it stable and scalable. The time to shine has come.

CCO Scott Fleming and CEO René Hansen answer 4 crucial questions.

## 1. About Emultech

'Emultech -founded in 2009 as a spin off from the Technical University Eindhoven- is a deep tech company that helps pharmaceutical organizations with more efficient drug delivery and new formulations in order to contribute to a better quality of life. We formulate controlled release microspheres using our proprietary and scalable microfluidic platform for small or large molecule drugs in collaboration with researchers and product developers. Often starting first with feasibility or proof-of-concept research, we can continue the journey and support our partners through clinical phases and even into production. You can find our headquarters on the High Tech Campus in Eindhoven.'

Patented platform using microfluidic chips

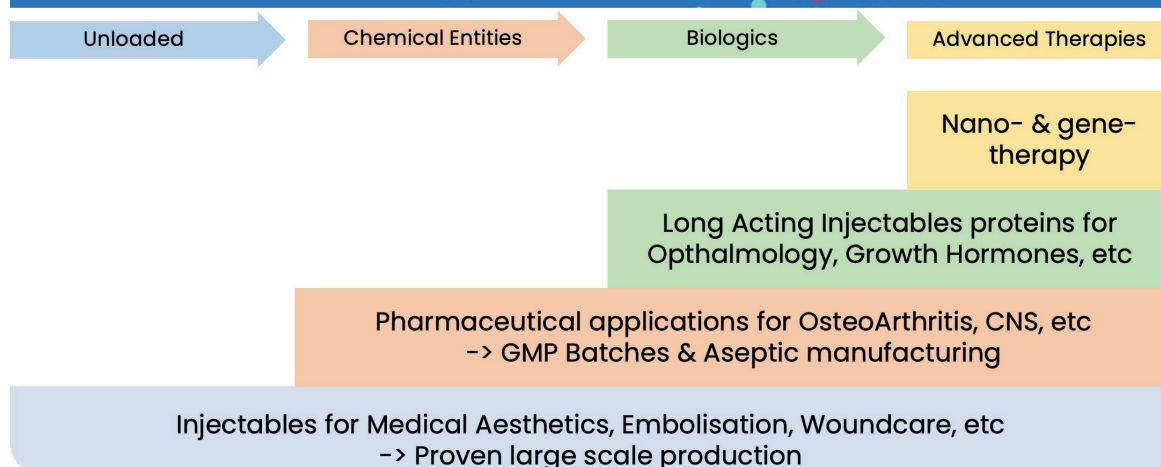


## 2. About the (advantages of) the patented microfluidic system

'Microsphere emulsification has traditionally been done in batchwise, uncontrolled and turbulent mixing process (like mayonaise), a very unpredictable and non-scalable method. By making the microspheres using our patented microfluidic chip system, we make microspheres one-by-one, in a process that is highly controllable, consistent AND scalable. The production is done with an innovative silicon microchip with up to one hundred channels all operating in parallel (see image). In this way, Emultech has developed a very robust way to increase the microfluidic emulsification throughputs, removing the previously existing bottle neck: scale-up of formulations from small lab quantities in milligrams and grams to required production volumes in the kilograms. Compared to the scale-up of emulsification with conventional manufacturing methods, our scale-up using microfluidic emulsification through parallelization has huge advantages. It does not require new optimization with every increase in scale, which significantly shortens the development timelines. This is in addition to the high batch-to-batch consistency and high particle control, factors which greatly lower the risk, and cost, of development.'

'Emultech's platform technology can as well be used to generate hydrospheres through water-in-oil emulsification that brings similar and additional

## Proven, Scalable platform with broad range of applications



advantages:

- ultimate control on particle properties, such as size, circularity and morphology
- fast development due to instant scale-up
- consistency of production due to the continuous manufacturing method
- protein encapsulation with controlled degradation using proprietary polymer

monodispersity and with circularity above 98%! The microfluidic process also has much higher yields (>90%) versus conventional batchwise processes which can have yields as low as 40%. The formulation of controlled release systems is a multifactorial complex process. High control of particle characteristics during production is crucial and can be achieved with Emultech's microfluidic emulsification'

## 3. About Controlled release Microencapsulation and targeted drug delivery.

'Microencapsulation of a drug in a biodegradable polymer matrix leads to a controlled and consistent release of the drug over a period of time, which improves the overall therapeutic effect. Controlling the drug delivery in this way also can enable a switch from a daily injection to a once a month or even once every six months administration, which improves patient convenience and increases compliance, which results in better patient outcomes. This is especially beneficial for chronic conditions and for diseases with high non-compliance rates like mental disorders or serious eye diseases requiring repeated injections directly into the eye.'

'The aim of targeted drug delivery is to achieve a desired pharmacological response at a selected site. This is for example important in chemotherapy, since it improves efficacy and lessens the side effects. Through local delivery of the API to its target site versus systemic delivery which has to pass through the whole body to reach the target site, the overall toxicity of the drug as well as the dose required to produce the desired effect are reduced. One of the key parameters to achieve targeted delivery is the ability to control the size of the drug delivery system, in this case the microspheres. Microfluidic production enables precise particle sizes with extremely high

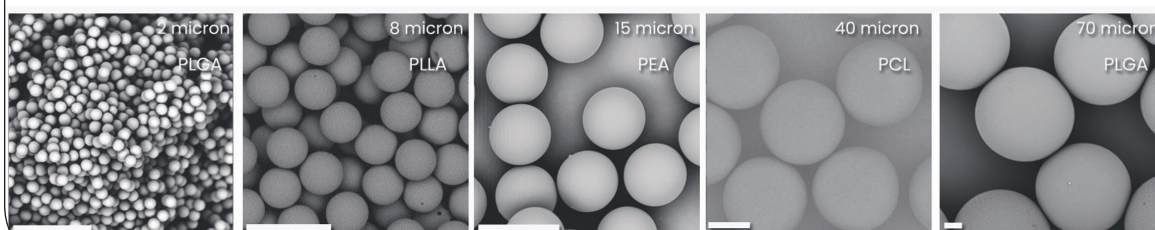
## Successful partnering & combining: Bone-Tech

One of the most successful joint ventures of Emultech took form in 2021 when Emultech and Osteo-Pharma announced their joint venture to develop what could be the first disease modifying treatment for osteoarthritis of the knee. The joint venture, called Bone-Tech, brings together Osteo-Pharma's novel combination drug therapy for the local treatment of osteoarthritis with Emultech's world leading microfluidics' microspheres technology. Bone-Tech's patented OsteoActivator™ microspheres treatment promises to be the first and only extended-release treatment targeting subchondral bone remodeling for patients suffering from osteoarthritis-related pain and disability. A beautiful way of combining controlled release with a novel drug therapy.'

## 4. About Partnering

'Emultech actively seeks partnering and collaboration opportunities to develop and launch improved and innovative products. Every day we find new opportunities in partnership with pharma, biotech, medical device and academic institutions. Contact us to see what works best for you.'

## Ultimate control across particle sizes



Scale bar: 20 micro