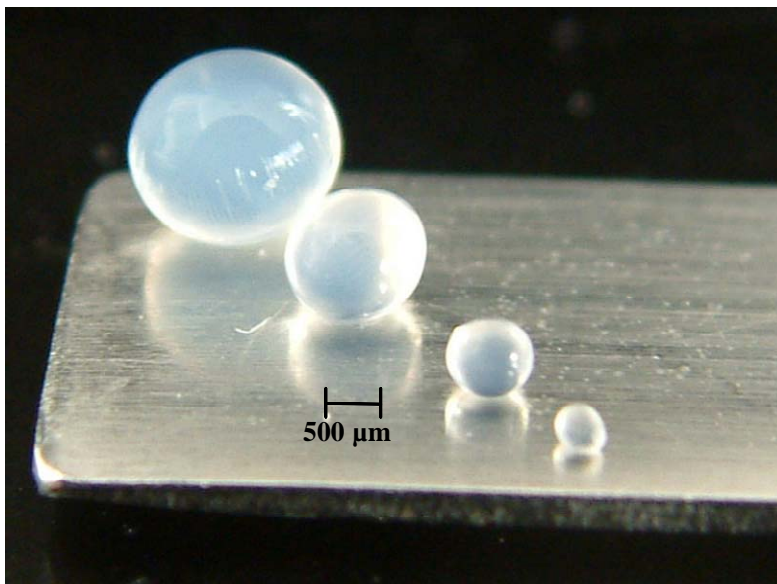


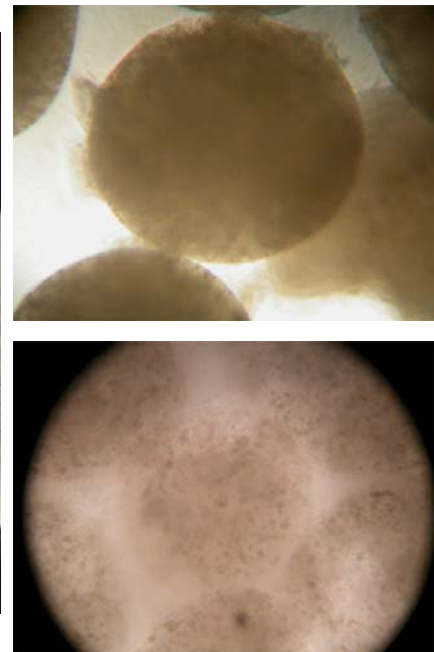
## Biodegradable polymer microparticles manufactured by Prilling

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Laminar jet break-up (prilling) is a technique able to produce microparticles with narrow dimensional range and high drug encapsulation efficiency in very mild operative conditions. Microparticles made of biodegradable/biocompatible polymers obtained by prilling are able to protect bioactive compounds or biological material improving drug bioavailability by modification of the release kinetics, protection from degradation or delivery to a specific site. Moreover, microparticles made by prilling loaded with different cell lines show good cell viability and are very promising bioreactors.



Alginate beads manufactured by prilling in different operative conditions



Procine hepatocyte encapsulated in alginate beads manufactured by prilling

### 1. Description of the product

The project involves the production of biodegradable/biocompatible microparticles manufactured by laminar jet break-up (prilling). This innovative technique allows the production of microspheres, in mild operative conditions, by breaking apart a laminar jet of polymer solution into a row of mono-sized drops under the influence of a superimposed vibration. The fall of the droplets into a polymer gelation solution produce solidified beads. Release profiles of encapsulated active compounds can be modulated by choosing the appropriate polymer material and/or by the morphological properties of the beads. Alginate and pectin beads produced by prilling are able to protect drugs degradation in gastric conditions, modulating at the same time the release of the active compound in the intestine.

## 2. Innovative aspect of the product

Prilling technology because of the mild operative conditions allows to encapsulate sensible drugs and biological material with low stability, preventing degradation during the encapsulation process and in the environmental conditions. Drugs, peptides, protein and different cell lines can be encapsulated without any sensible degradation and loss of cell viability. This technique, together with the employ of enteric or specifically degraded polymers, allows the protection in gastric environment and controlled release of active ingredient in the desired tract of the intestine, increasing the absorbed fraction and maintaining constant bioavailability. Different cell lines can be encapsulated into biodegradable beads without loss of cell viability.

Good exchange of active ingredients between the polymer matrix and the external environment can lead to the formulation of bioreactor.

## 3. Main advantages of the offer

Pharmaceutical applications require highly reproducible dosage and the controlled release of active agents and this can not be achieved with conventional powders and granulates. Laminar jet break-up technique can provide microspheres with a monodisperse grain size distribution and the smallest divergence. The encapsulation unit can be easily scaled up and have very low energy consumption, besides it operates at atmospheric pressure. Moreover, it is almost noiseless during the encapsulation process.

## 4. Technology key words

Biodegradable polymers, beads, bioreactor, drug controlled release, prilling

## 5. Current Stage of Development

Work in progress – Tested in laboratory

## 6. Intellectual Property Rights

Product of the research is still not covered by patent

### Technical and scientific publications

P. Del Gaudio, P. Colombo, G. Colombo, P. Russo, F. Sonvico. Mechanisms of formation and disintegration of alginate beads obtained by prilling. *Int. J. Pharm.* 302, 1-9, 2005.

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