

Executive summary

Microsystems have the potential to provide a wide range of technological solutions for the food industry. Micro and Smart Systems are miniaturised devices that can allow for example in situ, non-invasive, fast and automatic measurements. They can enable the building of multi-sensing platforms and use less sample and reagents. Their small size also allows low consumption of energy and enables them, unlike traditional laboratory equipment, to be distributed in space and time. Despite this interesting potential, only a few applications have been developed so far. The objective of the FP7 project *FoodMicroSystems* was to improve this situation by promoting the implementation of smart systems in the food industry.

The project started in September 2011 and ended in November 2013. The methodology is based in four main steps: (1) establishment of a knowledge base with the identification of major research players and research projects, (2) analysis of the offer with the identification of technological solutions proposed by microsystems developers, (3) analysis of the demand with the study of the needs and constraints for implementing microsystems in the food industry (industry needs, consumer acceptance, regulation constraints and ethical aspects) and (4) synthesis of the previous finding into three application roadmaps for the implementation of microsystems in the dairy, meat and beverage sectors and into one final report that provides suggestions to address the technological needs in three areas (chemical and biochemical electronic sensors, microorganism detection and tracking & tracing systems). All the reports prepared during the project are published on the public website www.foodmicrosystems.eu.

The project results demonstrate that there is strong demand from the food sector that can be met by solutions proposed by microsystems developer: applications of micro systems technologies (MST) in the food sector enable the improvement of the quality and safety of food, enhance the sustainability of the processes because of better process control, and enable product innovations that benefit consumers and society. The study indicates that the research efforts should focus on the implementation of MST solutions embedded on the production lines in the short-term, on portable devices for in-situ measurement in the medium-term and on food packaging applications in the long-term. These priorities emerged from the analysis of the regulatory framework, of the consumers' acceptance and of the environmental constraints, taking into account the maturity of the technological solutions.

The project roadmaps can be used a source of inspiration for the European Commission and National funding authorities in terms of future programmes but can also be directly used for both, industry and research organisations to define their own roadmaps and discuss collaboration strategies. The project recommends to increase research investments with the long-term ambition to allow the implementation of MST in packaging application and the short-term objectives to stimulate the adoption of MST solutions for process control at factory level. If the project identified many opportunities for further applications of MST in the food sector, it also revealed problems in the articulation of demands by the food sector that can be solved by MST, and expression of opportunities by technology companies. Further coordination of the cross-sector exchange of knowledge, ideas and research is required. The project recommends the European Commission to support such activities in Horizon 2020.