

Making waves in food



Advanced Microwave Technologies Ltd are a small company with a unique technology. They have embraced collaborative R&D funding schemes as a means both of connecting with new customers and markets, and of generating the data which demonstrates their technical and business case.

The need

Heating is a process widely used throughout the food industry. It plays a key role to ensure microbiological safety and in addition effects physical and chemical changes in food to develop key attributes such as taste and texture. Heating however is usually undertaken using hot surfaces and is often a batch process which is energy and capital intensive, and can detrimentally affect the functional components, such as nutrients and flavour.

There is therefore the opportunity for a cost-effective technology which can provide continuous, and accurate heating, without compromising nutritional quality and microbiological safety.

AMT Ltd. has developed, and patented, technology to address these needs and that further offers considerable practical and environmental benefits over traditional methods of heating.

The results

Advanced Microwave Technologies Ltd. (AMT) are a small, technology based company that offers a new method of heating using microwave energy. AMT have developed and patented technology which can deliver microwave energy deeply and evenly into liquids, suspensions and semi solids. The technology termed as microwave volumetric heating (MVH), can be applied to any food that can be pumped through a 50 mm pipe.

The advantages of the system are that desired temperatures in the foodstuff are achieved more rapidly and more evenly, and with excellent temperature control. Any product deterioration, e.g. loss of flavour or functionality caused by higher temperatures is minimised. Capital and process energy costs are significantly reduced. The process is continuous, and the equipment is quick and easy to disassemble and clean, giving the manufacturer better flexibility to respond to demand. Pilot scale trials have shown that one machine can safely and easily be used to process a wide range of foodstuffs. In 2010, AMT joined forces with

Queen Margaret University (QMU) and Nandi Proteins Ltd. to gain a Biosciences KTN SPARK award, which demonstrated the potential for both companies of future collaboration. AMT renewed the collaboration with QMU in a successful application for a Feasibility Study grant in the TSB 2011 Nutrition for Life competition, and achieved double success with a separate project proposal undertaken with Moredun Research Institute.

In addition, supported by the Biosciences KTN, AMT were invited to the prestigious TSB showcase, Innovate '11, where they made new contacts outside the food sector. Then followed another Biosciences KTN SPARK award, researching the effect of MVH on economically important but refractory microbes. The result of this work and support will enable AMT to acquire data demonstrating the efficacy of their technology, helping sharpen their unique sales proposition, and enable them to continue to build their business.

Project Information

2010 Biosciences KTN SPARK Award:

In a collaboration with Nandi Proteins Ltd., the AMT technology was shown to give excellent temperature control of the denaturation of proteins, opening the opportunity of developing new products which are too expensive to manufacture with conventional heating technology.

2011 Nutrition for Life Feasibility Study in collaboration with Moredun Research Institute:

This award is funding an investigation of the ability of the microwave volumetric heating to inactivate specified microorganisms which are currently resistant to conventional pasteurisation methods. If proved, this attribute will give the technology a significant technological advantage over alternative treatments.

2011 Nutrition for Life Feasibility Study in collaboration with Queen Margaret University:

The work funded by this award will rigorously evaluate the perception that foodstuffs taste saltier when cooked using AMT technology. If proven, the opportunity to make conventional recipes with lower salt levels will be created.

2012 Biosciences KTN SPARK Award:

In a project to define clear advantages for the AMT technology, the Agri-Food and Biosciences Institute in Belfast will research the effect of MVH heating on three economically important microbes, and compare with that of conventional heat processes.



“AMT is a micro business which has been greatly helped by the financial and personal support from the Biosciences KTN and the TSB at this critical time in our growth plans.”

Douglas Armstrong, CEO of AMT Ltd.

“The work funded by the SPARK award showed that Nandi technology can be used together with the AMT equipment to deliver milk products with different degrees of protein denaturation, an exciting development for us. We are optimistic about the potential applications for our combined technologies in other food areas, and are actively pursuing the opportunities that have emerged from this initial collaboration.”

Dr Lydia Campbell,
Chief Technical Officer of Nandi Proteins Ltd.

Project Details

Project partners:

Advanced Microwave Technologies
Nandi Proteins
Queen Margaret University
Moredun Institute
Agri-Food and Biosciences Institute

Project investment:

Biosciences KTN investment: £10,000
Total project investment: £86,405

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Above: The photo shows the 8 magnetron machine which is designed for small scale production in the region of 100-300 L per hour. The flexible system has many potential applications and so far has been adopted for the pasteurisation of juices and the production of sauces.



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