HORIZON 2020

Taking to market a novel filtration system for air purification

Reporting

Project Information

mTAP

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Project website

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Project closed

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€ 1 998 587,50

Coordinated by
SMART SEPARATIONS LTD
United Kingdom

Periodic Reporting for period 2 - mTAP (Taking to market a novel filtration system for air purification)

Reporting period: 2019-06-01 to 2020-06-30

Summary of the context and overall objectives of the project

What is the problem/issue being addressed?
Air pollution has negative impacts on our health, ranging from short-term effects, such as eye irritations or coughing, to long-term effects, such as respiratory infections, cancer, dementia and even death. According to the WHO, outdoor air pollution is estimated to have caused at least 3.7 million

premature deaths worldwide in 2012, but this could be higher if links to Alzheimer's and dementia are considered.

Smart Separations, Ltd. (SSL) has developed a proprietary ceramic filter that can be tailored and functionalised to suit many different applications in the global microfiltration industry. This disruptive filter will provide a more controlled, versatile, and low-cost solution for several industries, including stem cell & blood research, air filtration, lowering of industrial emissions and even food & drink processing.

First and foremost, we aim to address one of the most prominent issues of our day: pollution and air quality. Innovation is key to SSL's DNA and overall strategy. Moreover, this technology addresses key issues identified: the need for better, more efficient & cheaper solutions to remove micron-sized particles and break down pollutants for a cleaner, less harmful and healthier indoor air. Our system will improve the quality of air that people breathe, while addressing issues of reusability, cost reductions (e.g. lower energy) and increased functionality/operability. For these reasons, our mission to "Improve Quality of Life Through Innovation" is well reflected in this project. With this project we will achieve our ultimate goal: to improve indoor air quality across Europe and globally.

Why is it important for society?

There are growing concerns arising from pollution; greatly affecting the environment and health. Increasing reports link air pollutants to lung damage, allergies, breathing problems and even premature death. A recent BBC report claims air pollution kills 40,000 people a year in UK and costs the NHS over €20bn per year. Air emissions and pollutant regulations are tightening worldwide, and indoor air can be highly polluted, especially if a residential home is on a busy street and air is drawn in from outside (via aircon unit or ductwork).

So fundamental is the air quality and micro-particulate problem that the European Commission adopted an important directive in 2013, the Clean Air Policy Package, highlighting the enormous impact poor air quality has in Europe. The Commission estimates 58,000 deaths per year can be avoided through implementation of better policies, saving €40-140 billion in external costs and providing €3 billion in direct benefits due to higher productivity of the workforce, lower healthcare costs, higher crop yields and less damage to buildings.

There is an urgent need to at least protect air quality, but current technologies are still incapable of offering safe and high-quality air: expensive installed complex systems are neither energy-efficient nor long-lasting, requiring constant maintenance and offer poor filtration. Our disruptive product will bring large economic savings to the global high-volume microfiltration market. Industries currently pay high premiums for state-of-the-art technologies that are deficient. Nowadays, a single ceramic filter used in industrial processes can cost in excess of €5,000 and are only used for one particular function or have to be used in combination with other filters or systems.

What are the overall objectives?

The overall objectives of the project are to take our innovative ceramics microfiltration technology to a market-ready stage and kick-off our market entry commercialisation strategy for the indoor air purification market initially.

Within this project our filter will be refined to meet two goals: (i) a design of the micro-filter, ready for mass manufacture for clean-air applications, at the best possible price whilst improving the excellent performance of the prototype; and (ii) functionalising it, through mobilisation of special coatings, to attain novel capabilities that according to our market survey would be desired by potential customers.

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

The work performed in this period and the main results are listed below:
- Improving control of pore sizes through developments of a surface engineering machine. The aim is to achieve improved flow rates and a stronger structure through further improvements to membrane properties. We have had success with surface engineering, improved SOP to manufacture the core technology and conducted analysis and characterisation on our membranes.
- Developing coating methods to confer extra advantages to our membrane technology. Our work has shown promising results with the coatings conferring additional functionalities.
- A plug-and-play filter module was designed and built. The stackable filtration module allows for rapid assembly on a continuous manufacturing plant. The module will be tested and assessed in the next period.
- We have reviewed our existing lab-scale manufacturing process in preparation for pre-serialisation applications. This was conducted against best practices and benchmarks in virtual factory techniques to achieve design optimisation, process feasibility & operational effectiveness, efficiency and scalability.
- A Customer Development Plan was defined to question our business assumptions.
- A Business Innovation Plan was defined, which we further developed into a Business Innovation Plan.
- A Communication Plan was defined, and we have been continuing our communication and commercialisation activities.

Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)

The mTAP project, initiated in June 2018 to take to market a new filtration system for air purification, has been instrumental not only for the technical development and scale-up of SSL’s innovative ceramic membranes technology and product commercialisation but also for the growth of SSL as a whole. During the project lifetime SSL has:

a) Increased the number of employees from 9 to 17.

b) Opened a subsidiary company in Portugal, which led to securing a further 1.9m € for technology development, product commercialisation and industrial production.

c) Established the manufacturing process for the ceramic membranes technology.

d) Expanded the facilities in the UK, to accommodate the capacity to produce 3,000 ceramic membrane elements per day.

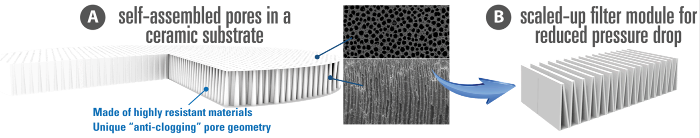
e) Started the commercialization of its two first products: Smart Membranes/Smart Membranes+ and GinoTM.

f) Increased its IP portfolio, which has recently been independently assessed to be worth £4.6m.

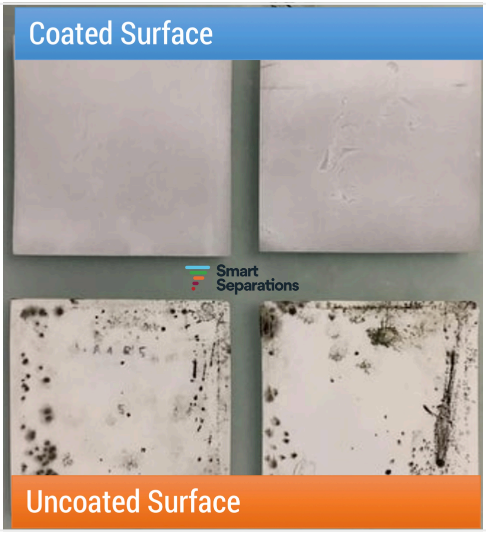
g) Developed or identified coating formulations suitable for applications to the ceramic membranes to achieve enhanced functionality.

h) Attended conferences, trade shows and seminars, and used social media channels to disseminate SSL’s work, identify new customers, create awareness about indoor air pollution and increase network.

On the other hand, our two key products have been further advanced with this Project: Gino™and the Smart Air Box Pro.



Conically-shaped pores in a ceramic filter assembled into air filters



Antimicrobial coatings for ceramic membranes allow our technology to remove microorganisms from air.

Last update: 1 April 2024

Permalink: https://cordis.europa.eu/project/id/811822/reporting

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