AIMPLAS

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INFORMATION ON THE ECO-INNOVATIVE SOLUTION PROVIDER

AIMPLAS, the Plastics Technology Centre located in Valencia (Spain) since 1990, is a private non-profit centre with more than 600 associated companies. AIMPLAS generates new knowledge and technologies that are transferred to companies, helping them to increase their competitiveness.

AIMPLAS is formed by more than 140 highly skilled professionals with huge expertise in plastic materials and products for different sectors and has over 20 pilot plants. AIMPLAS has a broad expertise in recycling, compatibilization, compounding and special assisted processing technologies, gained in EU and national projects; it has a proven record of R&D successful cases in many EU projects. AIMPLAS has: 1) Sustainability & Recycling business-work line, whose R&D activities are focused on plastic waste management, recycling and reduction of environmental impact; 2) experience in eco-design, recyclability and new applications for recycled plastics; 3) state-of-the-art pilot plants for recycling & compounding; 4) recognized since 2010 by Der Bleu Engel to verify recycled products.

AIMPLAS carries out technical conferences, seminars and attends relevant events at EU level as speaker and/or with its own booth. It also takes part in international and national research networks and technological platforms and participates in 20 Standardization Committees.

More information at: www.aimplas.net

SHORT DESCRIPTION OF THE ECO-INNOVATIVE SOLUTION

AIMPLAS has developed an innovative recycling technology for plastics that combines an extrusion process with supercritical carbon dioxide (sc-CO_2) to achieve higher decontamination levels and improved quality of the resulting recycled plastics. CO_2 at supercritical conditions (T ≥ 31.1 ºC, P ≥ 73.8 bar) behaves as a hybrid between gas and liquid. It allows to take advantage of both the diffusion properties of gases and solvent properties of liquids to remove volatile contaminants from the molten plastics during the extrusion process. Sc-CO_2 is inert, inexpensive, odourless, easily available and environmentally friendly, while being excellent for dissolving small and non-polar organic compounds.

AIMPLAS developed this technology at a pilot plant scale, and it was then applied and scaled up at ACTECO within the framework of the EU-funded project LIFE EXTRUCLEAN. ACTECO is currently using this technology to recycle polyethylene (PE) packaging for solvents and phytosanitary products, allowing to eliminate the hazardous substances from the post-consumer PE waste, which can in this way be used again to produce the same packaging products.

More information at: www.life-extruclean.eu life-extruclean.eu/members/documents/1109150925_revista_bj.pdf

INDUSTRIAL SECTOR – MARKET SEGMENT AND ACTUAL APPLICATIONS IN INDUSTRY

The technology is being used successfully for recycling post-consumer packaging of hazardous substances and post-industrial waste from printed films. Current market segment consists of plastics recyclers and processors using plastic materials requiring decontamination. Because of the flexibility of the technology and the improved quality of the resulting recycled plastics, other potential applications for technology and materials are envisaged:

- Removal of contamination and odours in post-consumer plastics sorted from mixed municipal solid waste.
- Removal of odours in post-consumer food packaging (e.g., EPS boxes for fish).
- Removal of volatile compounds and odours in other polluted plastic waste (e.g., fuel tanks or automotive deposits).

INDUSTRIAL CLASSIFICATION - NACE CODE

E38.3.2 - Recovery of sorted materials

1. DESCRIPTION OF ECO-INNOVATIVE SOLUTION

Technical aspects of the eco-innovative solution

EXTRUCLEAN technology© combining an extrusion process with sc-CO2 has demonstrated its cost-effectiveness for the recycling of critical plastic waste streams that were either traditionally not recycled or their use was limited to low added-value applications because of their limitations in terms of mechanical or organoleptic properties. These technical limitations are due to the presence of critical substances in the plastic waste, such as hazardous substances, volatile compounds and/or odours, which are difficult to eliminate using conventional recycling technologies. The use of sc-CO2 is a viable treatment alternative to achieve higher decontamination levels: 70% increase in decontamination effectiveness compared to conventional treatment processes.

Because CO2 is directly applied in the extrusion process to obtain recycled pellets, it enables to work in a continuous regime, thus leading to very good productivity rates. In addition, the quality of the resulting recycled plastics is improved due to the higher decontamination levels, expanding their use to greater added-value applications (e.g., production of packaging for hazardous substances to close the loop).

The technology can be implemented at recycling companies taking advantage of their pre-existing equipment. In fact, one of the great advantages of the technology is its flexibility in terms of potential implementation for various purposes, sectors and end users (from recyclers to manufacturers of plastic products) through the adaptation of pre-existing extrusion lines.

Economic and environmental benefits of the eco-innovative solution

The generally accepted methods to eliminate the toxicity of hazardous plastic packaging involve grinding of waste and further cleaning by applying a series of washing, rinsing and drying steps. After drying the materials, they are processed through an extrusion process, getting recycled plastic pellets. These treatments involve a huge consumption of water, cleaning agents and energy, as well as large wastewater generation. The recycled plastics obtained from conventional processes are used in applications with low added value (e.g., pallets), as they generally show low mechanical and organoleptic properties.

A key objective of EXTRUCLEAN technology is to reduce the number of process steps applied in conventional recycling systems to decontaminate hazardous plastic waste, while also obtaining recycled plastics with higher quality. The sc-CO2-based technology is able to increase decontamination effectiveness and the recycled plastics quality, while reducing the number of washing and drying steps, allowing to reduce water (by 56%), chemicals (by 23%), energy (by 56%) and wastewater. This also results in economic savings associated with materials, energy and wastewater treatment.

2. AVAILABILITY OF THE ECO-INNOVATIVE SOLUTION AND BUSINESS PARTNERSHIP

Market readiness, Trade mark, existing market coverage, commercialization strategy

Current Technology readiness Level: TRL 9 actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies).

Commercialization strategy: license agreement.

Requirements to adapt the solution to the local market and potential applications/market size

EXTRUCLEAN© is a base technology that need to be adapted in each individual case, AIMPLAS offer technical advice to implement it.

On site-after-sales services support and the technical assistance requirements

AIMPLAS offers a solution ready to be used, the after-sales service must be agreed by the company with the supplier of the machine and other components.

Targeted local business partners

Waste managers (collectors and recyclers),

Plastic processors using plastic materials requiring decontamination (removal of volatile compounds and/or odours)

Type of local business partnership sought

Private companies

Local or Governmental Administration

The SwitchMed Program is funded by the European Union and implemented by the United Nations Industrial Development Organization (UNIDO) in cooperation with UN Environment Mediterranean Action Plan (UN Environment/MAP), the Regional Activity Centre for Sustainable Consumption and Production (SCP/RAC), and the UN Environment Economy Division.

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