The research leading to these results has received funding from the European Union’s Seventh Framework Programme (FP7/2007-2013) under grant agreement number 283707.

PolySolve

Development of a selective, green solvent based recovery process for waste PS and PC

The Need

Consumption of plastics within Europe is steadily growing. Western Europe currently consumes 25% of the world’s output, with packaging and construction the largest sectors.

The building and construction sector in Europe is, with a market share of 23% and 8.3 million tonnes of plastics, the second largest user of plastics after the packaging sector.

The steadily rising consumption of plastics is also creating an increasingly significant waste issue, which cannot yet be fully addressed by the waste recycling sector due to it being uneconomical or due to a lack of suitable technology. The inclusion of certain additives within a product has also often hampered the recycling process.

Equally, the high demand for virgin quality material means that there is an enormous market opportunity, if this demand can be satisfied, by recycled materials with the properties of - or close to - that of virgin material. Converters are regularly working with their customers base to look at product design opportunities and also to increase the use of recyclate within a product.

The EU Waste Framework Directive (2006/12/EC) also demands a five step waste hierarchy with firstly prevention, secondly reduction, then re-use, recovery and finally disposal of waste.

For these reasons it is of critical importance to further increase the value-added in the manufacturing sector, in terms of product design and increasing the reuse of recycled polymers.

Within this context, lies increasing opportunities for the (E)PS and PC recycling industries. Whilst recycling is generally on the increase, the PolySolve process aims to develop a selective, green solvent-based recovery process, which will offer a novel approach to recycling, by offering a product to converters with similar properties to that of virgin material.

The Concept

Our idea to meet this need is the development of a green, selective solvents to allow (E)PS and PC to be recycled more effectively.

The PolySolve project will deliver a modular, scalable process, centred on an environmentally friendly solvent-based system, to recycle (E)PS and (separately) PC, at the molecular level, into a high purity product comparable to virgin material. By selectively dissolving only the PS or PC and leaving impurities in an insoluble form, the process will convert waste into solid PS/PC of a very high quality.

The final technology will be the result of three years of scientific research and technological development in chemical and physical engineering.

As the PolySolve project is funded under the FP7 Research for SME-Associations scheme, the Associations’ members will be amongst the first to have access to the IPR of this project and be the first to reap the rewards of this technological advancement.
Impact

(Expanded) Polystyrene and Polycarbonate are amongst the 2 most widely used polymers within Europe.

EPS is widely used in food packaging (as fish boxes, for example) and is also used in construction, as a valuable insulation material in your home or office.

PC is widely used in ‘optical’ materials, such as audio CD’s, but also in the automotive and packaging industries.

Recycling rates for EPS and PC are increasing, but the PolySolve process will offer a complimentary recycling process, to those already existing, ensuring that:

- A novel, ‘green’ solvent-based approach to recycling is developed and optimised, with the potential to be developed for other polymer types
- PolySolve will offer a higher purity recyclate than is currently possible.
- The feedstock can be re-used in a variety of other products, due to the removal of specific additives
- A range of green solvents and formulations suitable for selectively dissolving PS/PC products and components
- A scalable recycling plant suitable for decentralised PS and PS recovery
- EU Directives concerning waste materials and landfill are met.
- Reduced landfill and subsequent CO₂ emissions.

The SME and SME Association beneficiaries are excited about the developments within the project and look forward to optimising the process and making it a commercial reality.

The Project Consortium

In order to make the necessary scientific and technological advances required to develop such a product and in order to ensure the product is accessible by all users across Europe, the project has been awarded funding by the European Commission under its Seventh Framework Programme (Research for SME Associations).

The consortium is made up of a pan-European consortium consisting of research organisations, national associations based, European associations based in Belgium and industrial companies.

EuPC (Belgium) is European-wide trade association, representing plastics recyclers, on a wide range of issues, across a number of working groups.

EuPR (Belgium) is the European-wide trade association, representing European Plastics Converters (or ‘processors’), with over 50 national and European industry association members.

British Plastics Federation (UK) is the leading trade association of the UK Plastics Industry (representing approximately 80% of market turnover). The group works to provide a springboard for collaborative initiatives that support the evolution of the UK plastics industry and steer new business to member companies. It encompasses over 450 companies from the plastics industry supply chain, including polymer producers, suppliers and processors in addition to additive and machinery suppliers and manufacturers.

Fraunhofer-IVV (Germany) is a competent and professional organization that carries out contract research and development work for industry, relating to Process Engineering and Packaging.

Reytraplast (Spain) is a Spanish SME, within the plastics sector.

Env-Aqua Solutions (UK) is an environmental consultancy, offering expertise in turnkey design, manufacture and supply of plan and equipment, strongly allied to pollution prevention and control via recovery based approaches.

TWI (UK) is one of Europe’s foremost independent not-for-profit research and technology organisations across a number of industry sectors, with an expertise in materials and materials joining.

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Latest News

The project consortium has been successful in developing several ‘test cases’ over the last 2 years and are now focussing on developing and optimising the recycling process.

Results to date, tested on post-consumer EPS Fish Boxes, have proved successful & produced a recyclate to a high degree of purity. The challenge now is to replicate the results on a larger scale and to an even higher degree of purity.

We are also looking at EPS Construction related products, which is often complicated by the presence of brominated flame retardants. Trials so far however, have proved promising.

The project will complete on 31st October 2014.

Further Information

Further information can be obtained from the following sources:

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