UNIQUEST

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA
CREATE CHANGE

AVAILABLE TECHNOLOGY

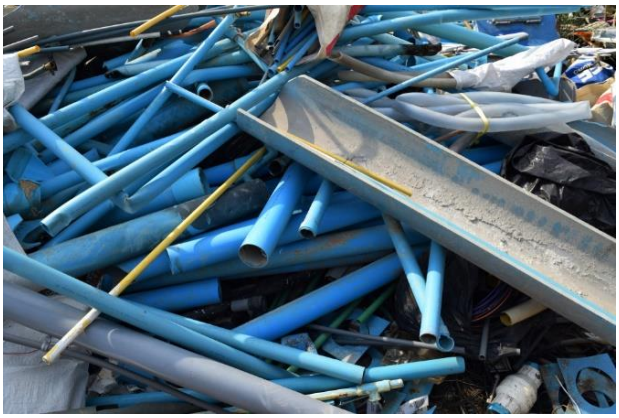
Contaminated Waste PVC Conversion to Carbon Fibres

Key Features

- Contaminated or mixed waste PVC conversion to high yield carbon fibre. Cheap feedstock and environmentally friendly
- Virgin PVC conversion to high yield carbon fibre. Higher fibre rate production & no solvent required
- PVC feedstock lowers costs by replacing established technology using PAN for carbon fibre

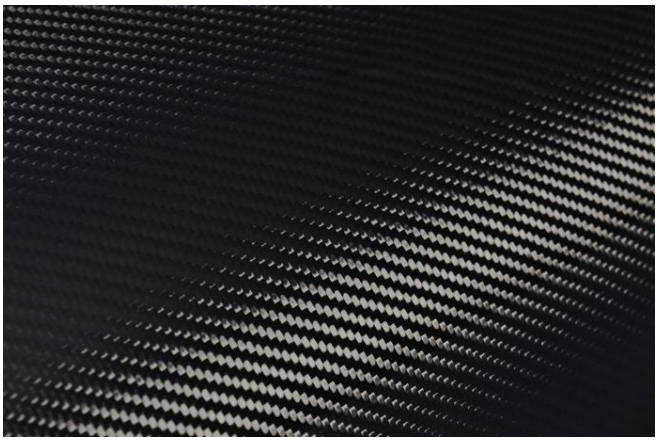
Background

Polyvinylchloride (PVC) is the third most produced synthetic plastic polymer after Polyethylene and Polypropylene. PVC and plasticised PVC are some of the most difficult plastics to recycle. There is a huge global challenge dealing with them. Most material cannot be recycled, so it is sent to landfills or incinerators. The hydrochloric acid (HCl) off-gas following decomposition is also a problem if uncontrolled.



Carbon fibre is a valuable resource for making carbon fibre composites that can be used in aerospace and defence, alternative energy, automotive, construction and infrastructure (reinforced concrete, masonry, steel, cast iron), sporting goods, microelectronics and advanced manufacturing. Existing techniques to produce carbon fibre use Polyacrylonitrile (PAN), which is an expensive feedstock at >$25/kg.

A low-cost method is needed to take contaminated waste PVC (and plasticised PVC) then turn it into carbon fibres at a lower cost than traditional processes using PAN.



The technology

Researchers with The University of Queensland's (UQ) School of Chemical Engineering have developed a novel process of taking contaminated waste PVC, separating it from contaminants, chemically stabilising the fibres and converting them to lower weight/higher strength carbon fibres with high carbon yield after heating. This process could significantly lower the cost of producing carbon fibre from PVC.

This invention uses two key steps for the conversion of PVC to carbon fibre:

- Separation and solvent spinning from contaminants, and
- Chemical stabilisation and carbonisation of the carbon fibres.

Intellectual property

Patent pending.

Commercialisation opportunities

We are seeking licensing or collaborative partners to further develop this exciting technology for applications in PVC recycling, circular economy applications and lower weight/higher strength carbon fibre.

Research leaders

Associate Professor Bronwyn Laycock is a senior researcher with the School of Chemical Engineering and the DOW Centre for Sustainable Engineering Innovation at The University of Queensland, Australia. Her research has ranged from bio/degradable polymers, composites, organic and organometallic synthesis, waste conversion technologies, pulp and paper chemistry to general polymer chemistry. She is currently working across a range of projects with a focus on materials for circular economy applications and management of the transition to the new plastics economy. Research includes biopolymers (polyhydroyalkanoates), polymer lifetime estimation and end-of-life management/conversion technologies, biocomposites, controlled release matrixes for pesticide and fertiliser applications, polyurethane chemistry, polymer foams, biodegradable packaging, carbon nanofibre production and peptide based conducting nanowires.

Associate Professor Steven Pratt is a senior researcher with the School of Chemical Engineering at The University of Queensland, Australia. He leads research on process development for sustainable waste management. His research focuses on utilising waste streams as feedstocks for the production of biomaterials and biofuels. These activities feed into broader biorefinery research programs, which aim for waste streams to be routinely utilised as feedstocks. He is a major contributor to the field of environmental biotechnology including the invention to the TOGA Sensor for examination and control of biotech/bioprocess systems. He is also a lecturer in Water Cycle Engineering with the International Water Centre (IWC).

About UniQuest

UniQuest is Australia's leading technology transfer company. We manage and commercialise the intellectual property of UQ to create change and deliver solutions for a better world. Our innovation portfolio has seen the creation of more than 100 start-up companies, and includes Australia's first blockbuster vaccine Gardasil®, the internationally acclaimed Triple P-Positive Parenting Program and superconductor technology used in most of the world's MRI machines. In 2015, our spinout company Spinifex Pharmaceuticals secured Australia's largest ever biotechnology acquisition.

Contact

Derek Stephens
Director, Commercialisation - Physical Sciences
UniQuest Pty Limited

P: +61 455 834 333
E: d.stephens@uniquest.com.au