Fluorescent markers

illuminate EFSA's PET requirements

A British consortium has combined their expertise and resources to help improve the recyclability of plastics, writes Professor Edward Kosio.

Attempting to solve the plastic issue is certainly dominating global news and for good reason. As organisations and individuals around the world explore innovative avenues to collect and recycle plastic, we are still producing virgin plastic at an alarming rate.

The resulting chaos can be likened to attempting to mop up the bathroom floor whilst leaving the bath taps running.

A problem to be sorted

Since the expansion of the manufacturing of plastics in the 1960's, 8.3 billion metric tons of non-recycled plastic has been produced. This has generated 6.3 billion metric tons of waste, 79% of which has piled up in landfills while just 9% has been recycled.

This does not make plastic the enemy. Our inability to properly sort and recycle plastic fuels our need to continue producing more virgin plastic.

If current production and waste management trends continue it has been estimated that a total of 12 billion metric tons of plastic are expected to be in landfills or the environment by 2050,

which is a terrifying thought.

In 2019 the European Commission announced that of the 27.1 million tonnes of plastic waste collected in Europe in 2016, only 31.1% went to recycling facilities. The rest went to incinerators or landfills.

One of the main hurdles to boosting plastic recycling is the absence of an automated method for sorting and separating mixed plastic waste such as PET, HDPE and PP based on prior food contact.

Up until now food grade plastic has been the most complex to obtain due to the risks of using second-hand plastics potentially containing toxic chemicals that could be dangerous to human health.

Not being able to differentiate between a bottle that once contained milk and another that contained bleach obviously hampers the full recycling potential of numerous polymers from PET to Polypropylene.

The stumbling block is that recyclers need to be able to identify a bottle's plastic history during the sorting process, and with no effective way of separating food grade from non-food grade polymers most of it ends up being recycled into non packaging applications like crates and bins.

But this is about to change.

Introducing PRISM

A British consortium has combined their expertise and resources to find a solution to this pressing issue. Their aim has been to meet the European Food Safety Authority's (EFSA) requirement to achieve 95% food grade plastic for PET and 99% for HDPE and PP in two steps input in one single sorting step.

It took six years of research and trials and the consortium's innovative tech is ready to be launched on the market.

Plastic Packaging Recycling using Intelligent Separation technologies for Materials (PRISM) applies high performing luminescent materials to labels on plastic packaging, creating what is best described as an invisible barcode for plastics recycling.

The process is simple. Fluorescent markers – produced from materials recovered from fluorescent lamp recycling and non-rare earth based compounds – are printed on labels or plastic packaging sleeves.

As the mixed plastic waste runs along the con-

veyor belt, the high-speed sorting system is illuminated by an ultraviolet (UV) light source that identifies the coded PRISM label, reads its code and air-jets propel it into the appropriate recycling category.

Following extensive trials PRISM is now well proven in MRF (Materials Recovery Facility) setups and is plug & play ready. It is complementary to existing NIR (Near Infrared) technology and can easily be adapted to most sorting facilities around the world to target specific recycling streams such as food contact plastic packaging.

Even the most challenging plastic waste can be sorted

Until now the NIR techniques used to identify different polymers were unable to detect dark-coloured plastics as they absorb the radiation. PRISM allows recyclers to efficiently distinguish between food-grade and non food-grade polymers, identify black plastics and tag full-length shrink-sleeves.

This innovative technology uses traditional labelling and branding methods that can be coded to specify the status of the pack. The PRISM labels can be flattened, crumpled and soiled and will still be easily detected and the markers can be removed during recycling leaving no traces for the next cycle of use.

Even the most challenging plastic waste can now be sorted at full speed of 2 tonnes per hour to over 96% purity with a yield in excess of 95% for PET. This meets EFSA's stipulated 95% purity for PET food grade plastic in a single sorting step.

Other polymers such as PP may require two steps of sorting and can reach upwards of 99% purity.

A significant step forward

The first commercial trials have been completed; they include beverage bottles for a large international drinks company and a European recycling company that aims to utilise PRISM's unique sorting capacity to select specific products in the waste stream that require special treatment.

This is a significant step forward in the categorisation of plastics which are sorted automatically at high speed, and it opens up a wealth of new opportunities for brand owners wishing to recover their bottles as part of the circular economy.

Harnessing the untapped potential of post-consumer plastic waste will go a long way towards reducing the overflow from that mythical bathtub – making mopping the floor a much more effective exercise. ∎

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British Consortium of PRISM Partners
Nextek – PRISM project manager and recycling R&D
Brunel University London – Wolfson Material Processing Luminicescent expertise
CCL Labels – Multi-national label maker
Enlightened Lamp Recycling – Fluorescent lamp recyclers
Johnson Matthey – Speciality chemicals, catalysis and process technology
Mirage Inks – Leading manufacturer for printing inks for packaging applications
Tomra Sorting – World leader in automatic detection systems
WRAP UK – Leading waste and resources charity UK

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View the video here:

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