

Intelligent Sorting Boosting the Technical and Economic Performance of Recycled Post Consumer PP Packaging

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**PET Packaging: how to improve
circularity via the latest sorting
technologies? ONLINE Webinar**



NEXTEK LTD

WHAT WE DO

Recycling plant design and Feasibility studies.

Strategic advice to Multi-National Corporations and Recycling Co's.

Food-grade recycling of post consumer plastics – process development.

Research and development of novel materials and processes including plastics and bioplastics.

Business support, productivity improvement and problem solving.

Ground breaking projects for governments and major commercial organisations in the **EU, UK, India, Malaysia, USA, South America, Middle East, North Africa and Australia/NZ.**

Strong ties to Universities and Scientific Centres of Excellence in the UK and Europe.

AWARDS



POLYPROPYLENE

Growth of the "do everything" plastic



NEXTLOOPP - 53 participants
closing the loop on food grade rPP



Highest stiffness to weight ratio, insoluble,
strong, super-tough, transparent,
fibres, sheet, mouldings, furniture, appliances,
automotive, packaging.



NEXTLOOPP ahead of the curve

Since launching NEXTLOOPP Europe in 2020, we have been deploying our unique technologies to sort and decontaminate post-consumer PP packaging.

NEXTLOOPP UNIQUE TECHNOLOGIES

PolyPPPrismTM

Sorting food-grade packaging

PPristineTM

Decontamination technology

Our unique technology has taken 8 years of intense research and commercial trials to achieve and is now plug and play ready for use.

This technology has been designed to be implemented with current technologies, staffing and infrastructure.

Sorting with markers requires only one layer of ink on a label and UV light

Mechanical recycling offers the most cost and carbon efficient option for recycling plastics

NEW SORTING TECHNOLOGY BREAKTHROUGHS ARE ABOUT TO BE ANNOUNCED

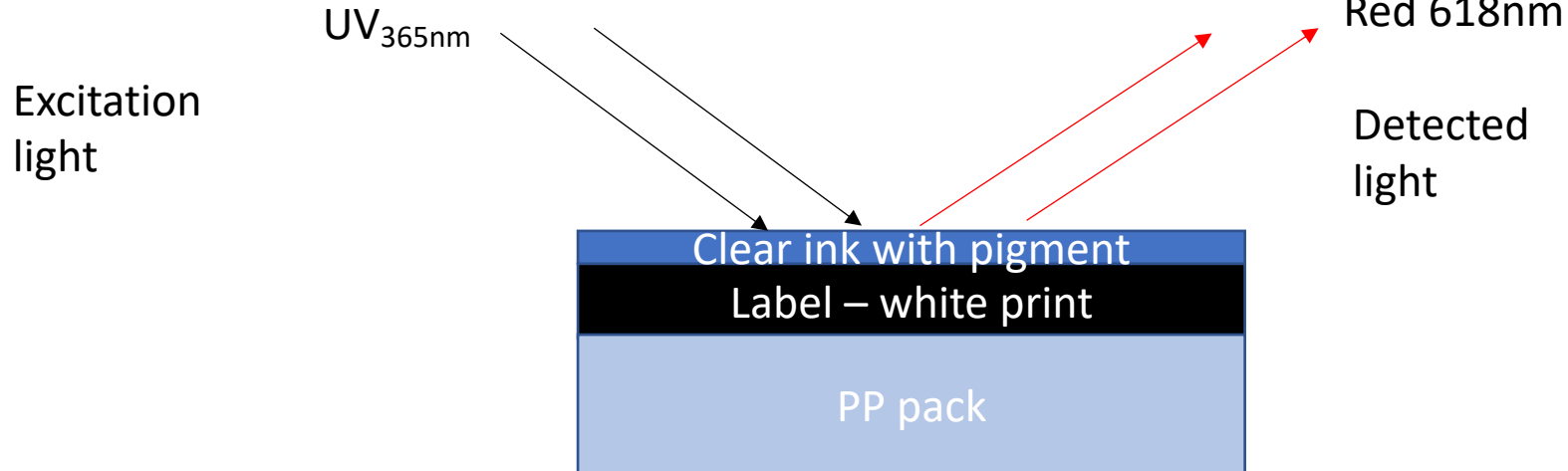
How it works: Fluorescent markers and labels

Ink – Clear UV free radical flexographic ink

White backed PP pressure sensitive label printed using 'flexo' print process



Labels in daylight

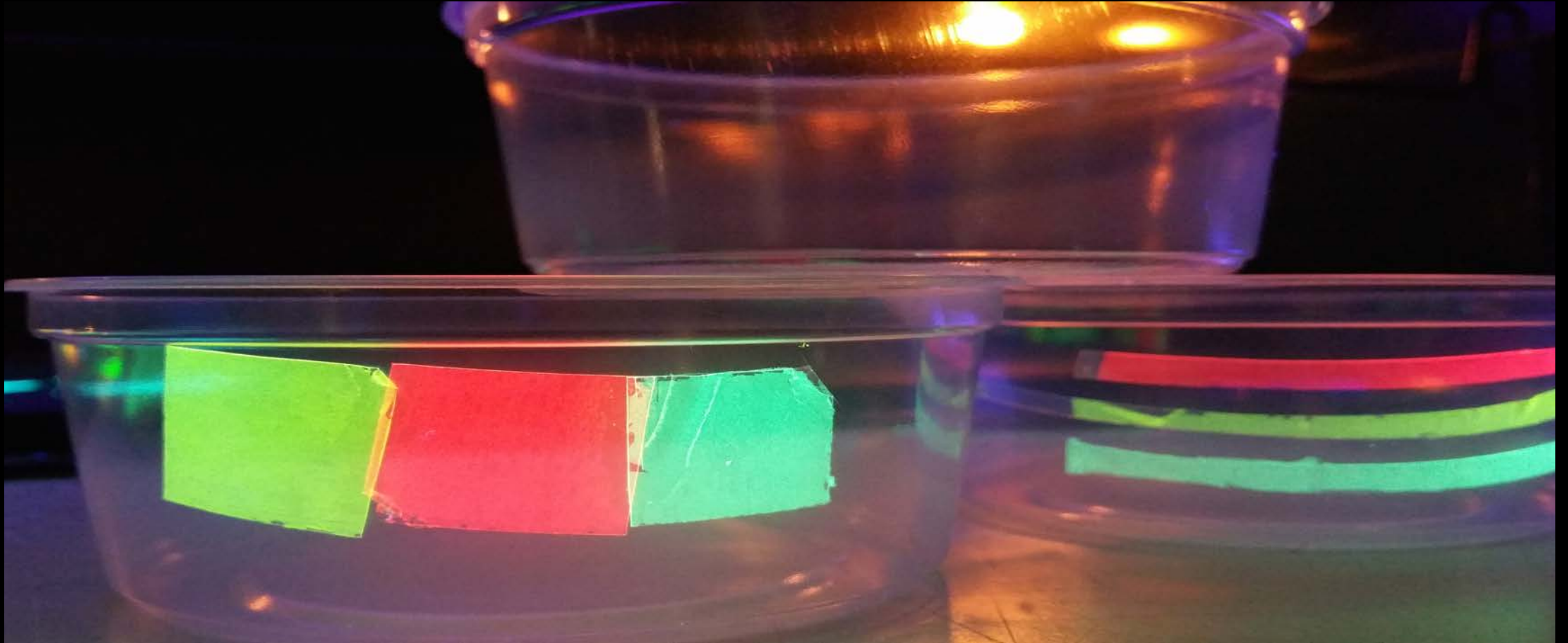


What the sorting machine camera sees

Invisible Markers with high quantum yield



Invisible Markers with high quantum yield



Invisible Markers on PET shrink sleeves





PRISM MARKER

SORTING

P R I S M



PolyPPrism

Markers for Sorting
Plug & Play Ready

>95%
Purity
on first
sort

>99%
Purity
on second
sort

3m/s

belt speed

2 t/h/m

throughput



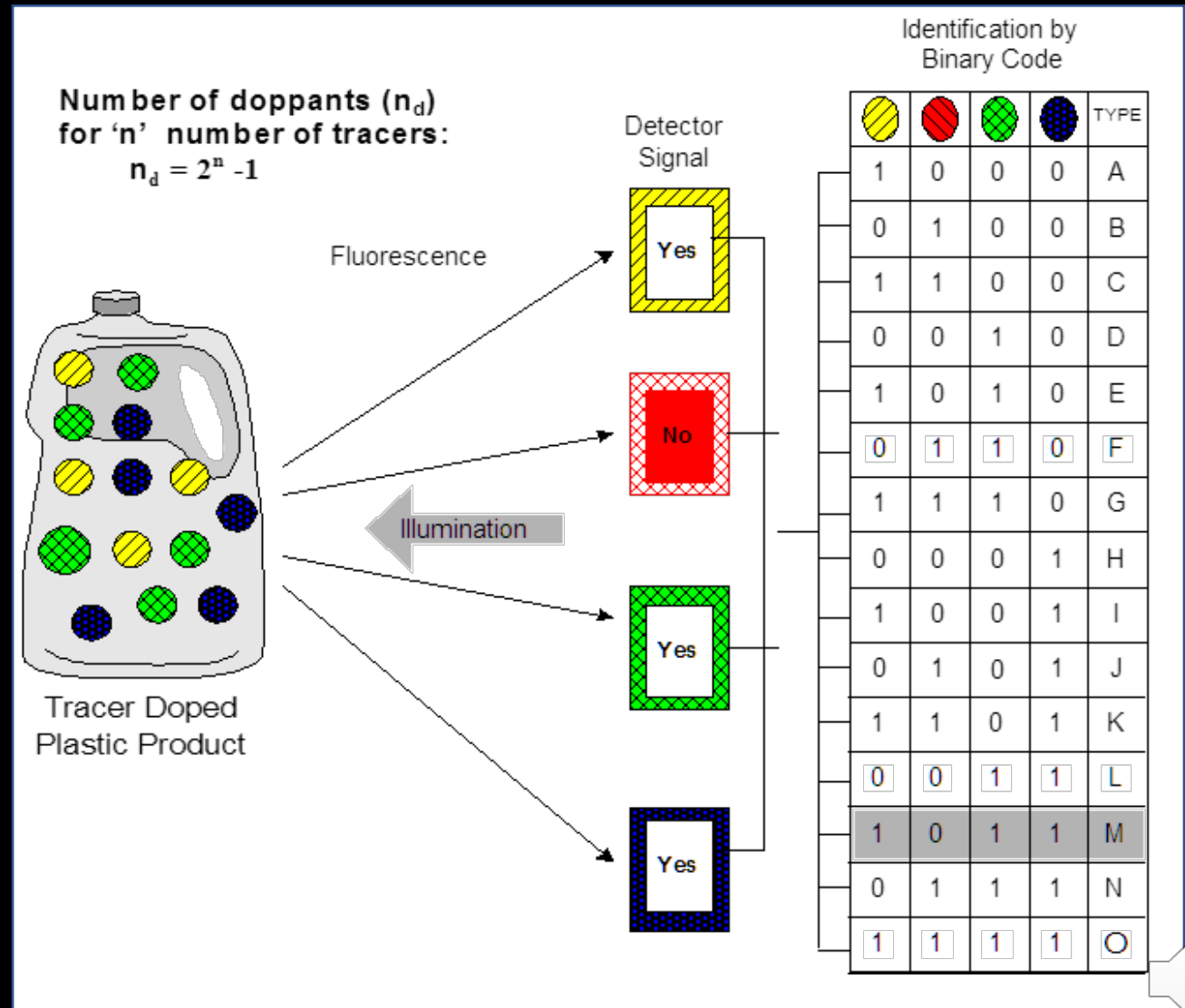
Packaging marked with intelligent labels can be uniquely identified and efficiently sorted using high speed, high-throughput commercial equipment.

This technology offers the potential to sort a range of targeted recycled materials such as food-grade PP, HDPE and PET packaging, as well as other materials using a non-polymer sorting process.

The future of sorting has to be high yield and high purity at full speed. PolyPPrism delivers this.

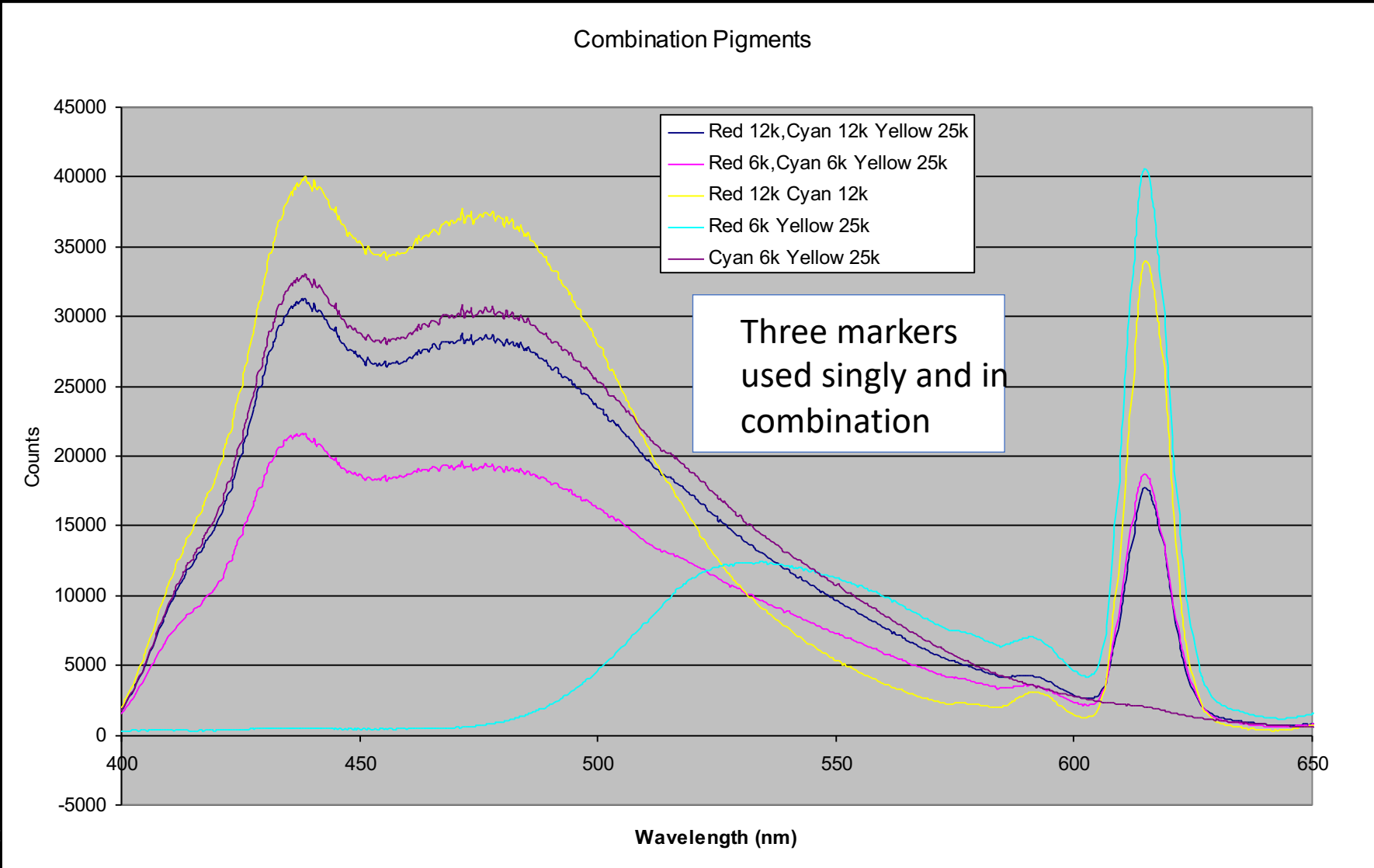
Opportunities for PolyPRISM_{TM} technology

- The use of multiple markers allows additional coding opportunities.
- The number of combinations is given by
Number= 2^n-1
- Four markers = 15 coding sets per type of plastic



Combinations of fluorescent materials

Code creation





NEXTLOOP

CLOSING THE LOOP ON FOOD GRADE PP

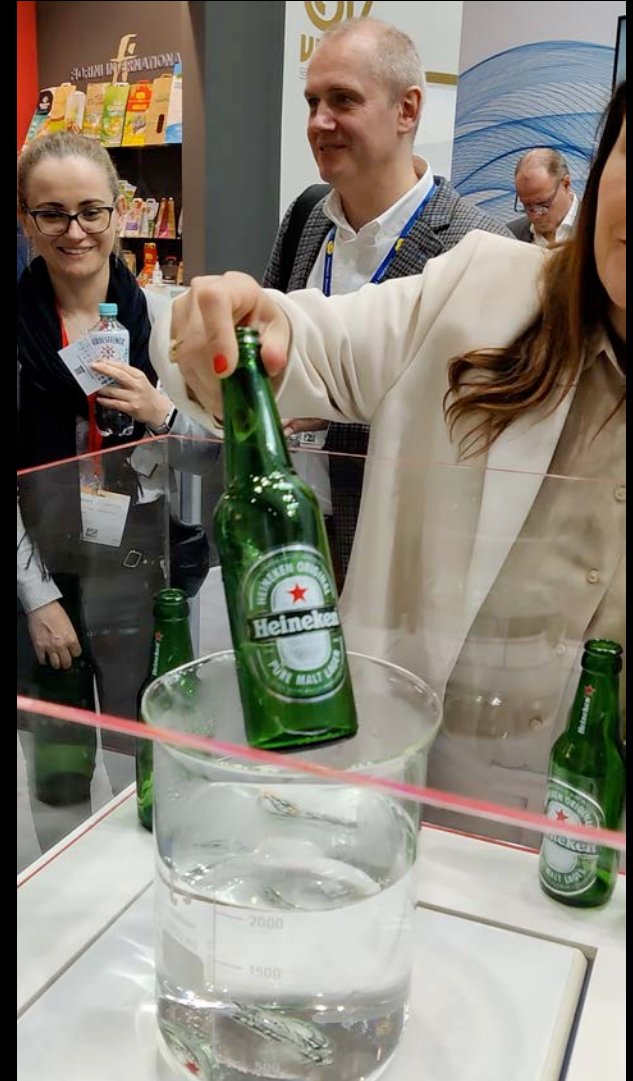
Selectivity of POLYPRISM Markers in automatic sorting

- Trial run at maximum production speed for the pack types 2.5m/sec
- Average Purity of sorted packs
- **First Pass 99.3%**
- Range of Purity of sorted packs
- **First Pass 98%-100%**
- Average Purity of sorted packs
- **Second Pass 99.9%**
- Range of Purity of sorted packs
- **Second Pass 98.88%-100%**

Food : Non-food = 80%/ 20%	Sorted Purity (%)	Notes
Trial 1 - Sealed Air		
Run 1-UV select yellow	99.21	1st pass
Second pass (select red)	100.00	2nd pass
Trial 2 - Danone		
Run 3-UV select yellow	100.00	1st pass
Trial 3 - Robinson		
Run 5-UV select yellow	100.00	1st pass
Trial 4 - Unilever		
Run 7-UV select yellow	98.00	1st pass
Second pass (select red)	100.00	2nd pass
Trial 5 - Greiner		
Run 9-UV select yellow	100.00	1st pass
Run 10-UV select Red	100.00	1st pass
Trial 6 -KP		
Run 11-UV select yellow	98.86	1st pass
Second pass (select red)	100.00	
Trial 7-PFF		
Run 13-UV select yellow	98.98	1st pass
Trial 8-Saputo		
Run 15-UV select yellow	100.00	1st pass
Trial 9 - All packs/ lids		
Run 18-UV select yellow	98.71	1st pass
Second pass (select red)	99.88	2nd pass

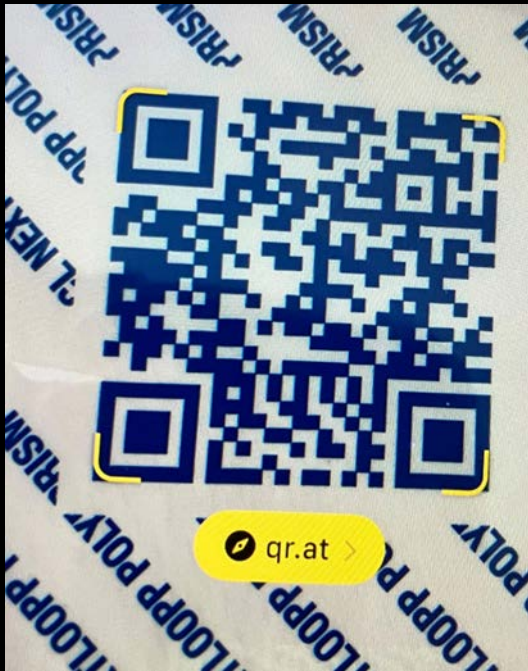
Adhesives

- Adhesives for self peeling labels
 - Hot water self-peeling removes labels, inks and adhesives
- Label removal
 - One long term study finds an average of 2.2 % of HDPE flakes with labels attached after conventional hot-wash process
 - Poor delamination = carry over of glues and inks
 - Glues causing gels and black speck impurities
 - Label and ink carry over can cause issues with food compliance and circularity



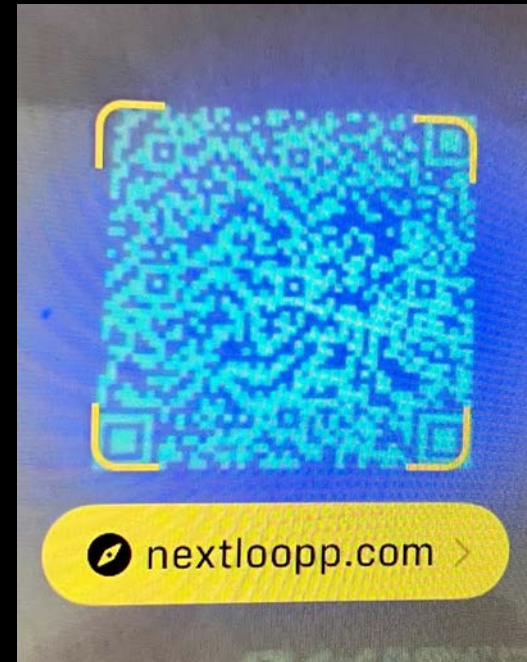
'BRAND QR CODES' AND 'RECYCLING QR CODES' ON LABELS

iPhone recognition of UV
visible QR code at HY
pigment concentration
0.35% w/w



'Brand QR code'

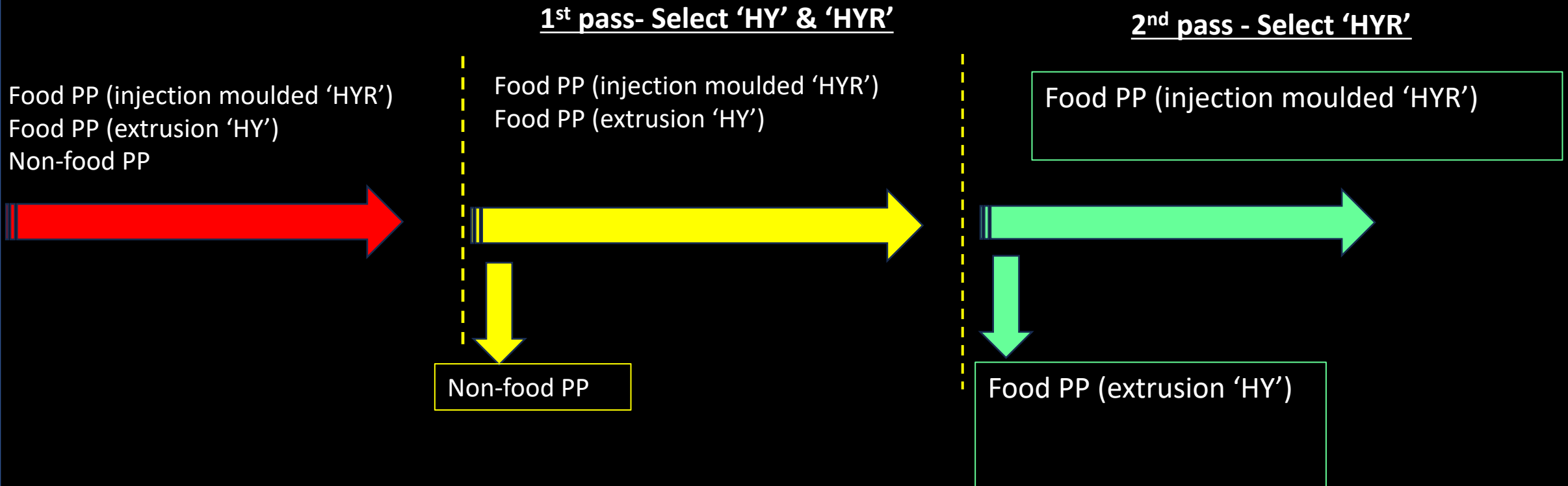
- Prizes to drive brand loyalty
- Social media engagement
- Customer service information
- Customer feedback
- Food recipes
- Food track and trace
- Food nutritional value
- Food allergy information
- Supply chain transparency
- Sustainability and disclosures



'Recycling QR code'

- Polymer traceability
- Recycled content and verification
- Polymer properties eg MFI
- Approval for contact with food

SEPARATING FOOD GRADE INJECTION MOULDED PP AND EXTRUSION GRADE PP USING UV VISIBLE MARKERS



HY AND HYR LABELLED PP PACKS VIEWED UNDER UV 365NM



HYR labelled PP yoghurt pot

HY labelled tray and bottle

98% SEPARATION INJECTION-MOULDED AND EXTRUSION GRADE PP



Without UV
zero packs selected
(Control test)



With UV - select 'HY and HYR'
(All selected- 100% yield)



With UV – select INJ packs
(Yield 97%, purity 97%)
Extrusion packs not selected
(Yield 98%, purity 98%)

Three essential stages in Food Grade PP recycling

A. Sorting into PP is the first step

B. Sorting into Food Grade PP is next

C. Extrusion and decontamination rate > 95% - 100%



NEXTLOOPP RESINS

rPP MATERIAL

NEXTLOOPP PPRISTINE™ NATURAL FG IM

NEXTLOOPP PPRISTINE™ NATURAL FG

NEXTLOOPP PPRISTINE™ WHITE FG

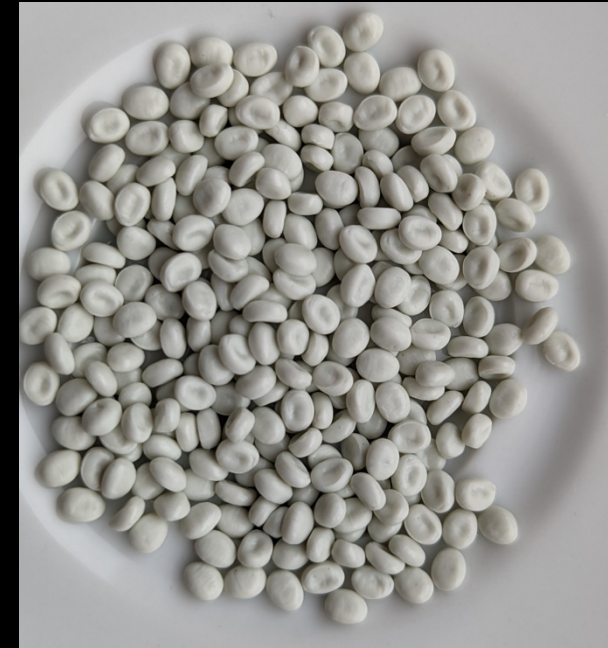
NEXTLOOPP PPRISTINE™ COLOUR FG

NEXTLOOPP PPRISTINE™ NATURAL INRT

NEXTLOOPP PPRISTINE™ WHITE INRT

NEXTLOOPP PPRISTINE™ COLOUR INRT

NEXTLOOPP PPRISTINE™ MIXED INRT



Industry Awards



 **Rushlight Awards**
Winner 2020/21



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