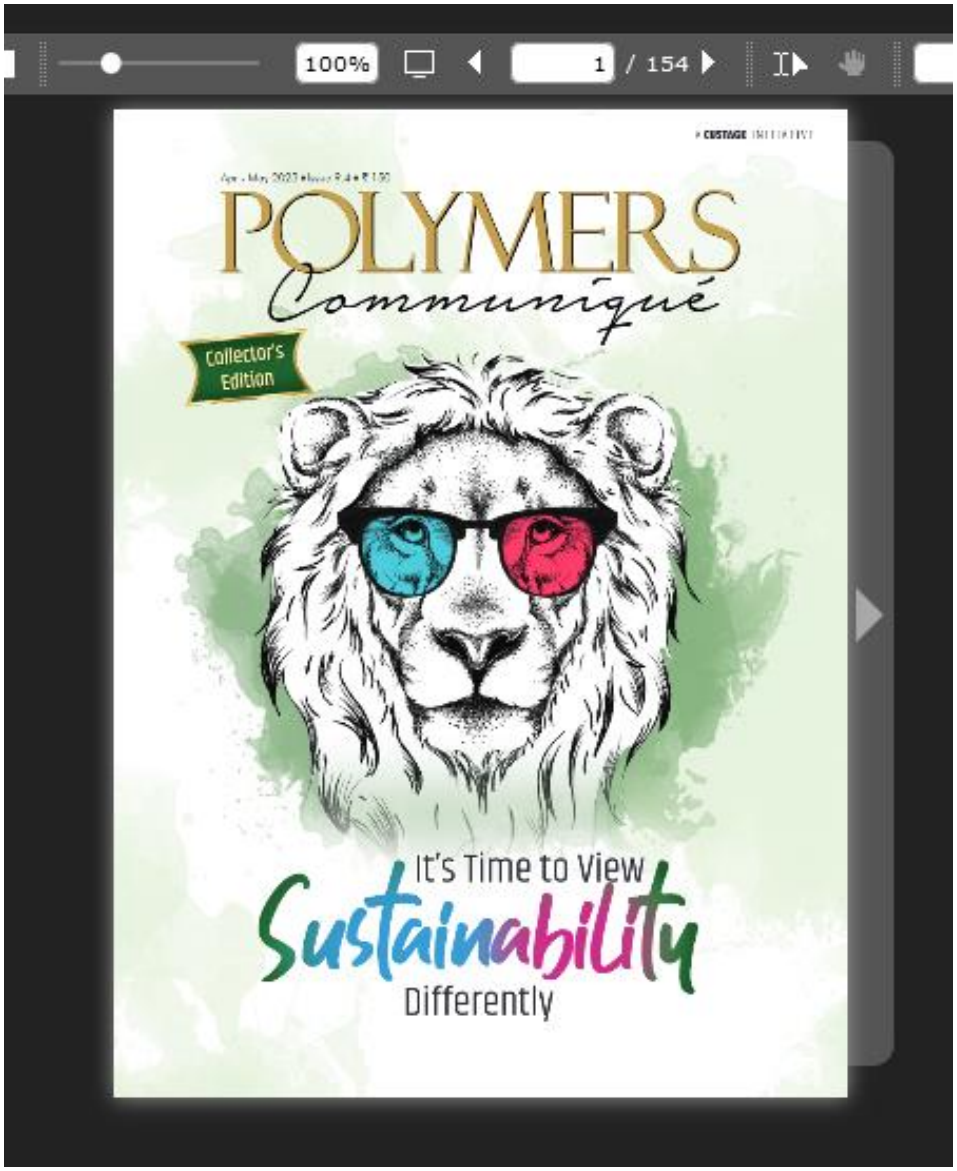
https://digital.mypc.co.in/flowpaper/php/simple_document.php?subfolder=&doc=9.4%20-%20Apr-May%202023.pdf#page=56



Digest

I-K

plasti

Navrang Machinery Unveils the Pinch Fold Bottom Machine for the BOPP Woven Bag Market

Glad to See
You are Enjoying Reading the Mag!
POLYMERS

www.theysohn.com

THEYSOHN

Total Solutions for PVC Extrusion

UPVC Window Profile Extrusion

Conical & Parallel Screws | Highest Outputs | Ease of Operations | Complete Downstream

OVER 400 INSTALLATIONS AT ONE SINGLE CUSTOMER.

Theysohn Extrusionstechnik (I) Pvt. Ltd.

land and in water. Therefore, the second responsibility of the industry (resin producers and processors) is to create a forum for discussing this subject and make reasoned decisions on standardising and simplifying additives used in plastics.

Addressing the Anonymity of Plastics: Traceability and Labelling

To address the serious problems of plastics' end-of-life issues, we must resolve another problem: the anonymity of plastics. A key barrier to improving the management of plastics is the lack of effective and sustained traceability along and across value chains [2]. Our ability to 'trace' plastics has been limited by various factors, including the ease with which we can identify them compared to other traditional materials such as paper, wood, aluminium, rubber etc., which results in the recycling rates of the latter materials being better than plastics (Refer Figure 3). In recent years, the ability to trace plastics has considerably improved. One of the objectives of all tracing technologies is to embed information into the plastic itself in such a way that it can be easily and reliably read out at the end of its use cycle. Three broad technologies are emerging for reducing the anonymity and improving the traceability of plastics. These are spectroscopic fingerprinting of plastics, incorporating small-molecule dyes or fluorophores that more accurately describe the composition of the plastic, and physical labelling through surface imprinting that can withstand the material's end-use cycles. A company, Digimarc, has piloted digital watermarks, in association with the European Brands Association, of the size of postage stamps, which can be decoded using a high-resolution camera. Another emerging science that may prove helpful in plastics traceability is 'chemical labelling', using sequence-defined synthetic polymers incorporated into commercial plastics and employing appropriate analytical techniques to 'read out' the information. The science behind such approaches has made substantial progress in the past decade; however, many challenges remain in translating this science into everyday applications.

Until more advanced solutions emerge, we can use existing mature technologies to improve the traceability of plastics. Since packaging is one of the most important areas of concern, we can use digital barcoding technologies to embed information about a plastic on the packaging itself. Such labels should inform us of the structure and composition of the product, key properties, additives used in the product, suggested manner of disposal and recycling, as well as the final destination of the plastic. Thus, the third responsibility of the industry is to progress towards full and transparent disclosure of the plastic and its constituents to enhance consumer awareness and enable more informed decisions on how to handle the given plastic at its end-of-life. Transparency in plastic product labelling must reach the same level of maturity that has been achieved in pharmaceutical or food products.

1. The first responsibility of the industry is to take the initiative to develop a set of easy-to-read and understand designations that truly indicate a plastic's structure and composition, as well as its ease of recyclability and end-of-life prescriptions.
2. The second responsibility of the industry (resin producers and processors) is to create a forum for discussing the subject and make reasoned decisions on standardising and simplifying additives used in plastics.
3. The third responsibility of the industry is to progress towards full and transparent disclosure of the plastic and its constituents to enhance consumer awareness and enable more informed decisions on how to handle the given plastic at its end-of-life.

The Importance of Collaboration and a Multidisciplinary Approach

Many questions remain to be answered. What information should be embedded, how long the information needs to remain readable, what is an acceptable cost of coding plastics, which plastics should be prioritised for coding, and what the appropriate read-out technologies should be are just some of these questions. This will require collaborative research and development between academia and industry. The dilemma of plastics waste is a global challenge that requires urgent intervention and concerted efforts linking academia, industry, finance, government and civil society. Many current approaches tend to focus on singular factors (e.g., waste management, segregation, recycling, innovations in recycling or upcycling value proposition, etc.). However, a systems-based, multidisciplinary strategy is necessary if we are to implement effective and long-lasting solutions to the staggering amount of plastics waste accumulating in our environment and minimise the impact of current and next-generation plastics. Technologies and systems to improve the identification and traceability of plastics in waste streams are critical components of this strategy.

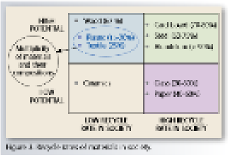


Figure 3: Recycle rates of materials in society.

References

1. Wiesinger, H.; Wang, Z. and Hellweg, S. Deep dive into plastic monomers, additives, and processing aids, Environmental Science & Technology, 2021, 55, 9339-9351; DOI: 10.1021/acs.est.1c00976.
2. Johnson, H.; Chambers, L.D.; Holloway, J.O.; Bousgas, A.; Akhbar-Khavari, A.; Blinco, J. and Barner-Kowollik, L. Using precision polymer chemistry for plastics traceability and governance, Polymer Chemistry, 2022, 13, 6080-6090; DOI: 10.1039/d2py01180h.