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Tracer technology in plastic identification—Past, present and future

ABSTRACT. The evolution of concepts for the automation of post-consumer waste plastic sorting is chronicled, homing in on fluorescent tracer-based identification in binary combinations of dyes in different plastics. Aspects of the applied research needed for the development of a prototype identification and sorting system in the author's laboratory are also elaborated. This is followed by details of an industrial trial of the system in a commercial enterprise, replacing manual operation by the newly developed automated system, in conjunction with the use of fluorescent tracer-doped plastic bottles of different types. The procedures adopted for the selection of dyes with suitable characteristics for tagging different types of plastic with acceptable compatibility in binary combinations are also elaborated. The preliminary trial showed promise for commercialization. However, for cost-effective sorting of a wide variety of post-consumer plastic with acceptable end purity and commercial viability, there is an evident need for further developments in some areas, notably: better choice of dyes compatible with the constituents of all the polymer types selected for sorting; faster electronic data processing; and mechanical handling of individual items on a conveyer belt at much higher speeds (including enhancing the efficiency of the ejection mechanism).