

## RESEARCH ON MICROBIAL DEGRADATION/DETERIORATION OF PLASTICS

Irina Eugenia Lucaciu, Catalina Stoica, Mihai Nita Lazar

National Research Development Institute for Industrial Ecology – ECOIND, 71-73 Drumul Podu Dambovitei, district 6, 060652, Bucharest, Romania, [bioteste.ecoind@gmail.com](mailto:bioteste.ecoind@gmail.com)

### **Abstract**

The development of the packaging industry is closely linked to the evolution of lifestyle and consumption in modern society. Polymeric materials (plastics) are now used in all sectors of life as very durable products, for various purposes such as packaging, transportation, industry, agriculture, etc. Synthetic polymer, produced from petrochemicals, causes pollution and deleterious effects on the environment due to its non degrading nature.

In the recent years, an intensive activity has been undertaken to develop novel plastics which have performance comparable with that of conventional polymers, but are also susceptible to microbial degradation. The actual tendency is to substitute polymers as polyethylene, polypropylene, polystyrene, polyethylene tetraphtalate with biodegradable plastics, which degrade upon disposal by the action of living microorganisms, like bacteria and fungi that are heterotrophic in nature. The microorganisms recognize polymers as a source of organic compounds and under the influence of endo- and exoenzymes the polymer degrades into smaller molecules, which enter into cellular metabolic processes, generating energy in the form of CO<sub>2</sub>, CH<sub>4</sub>, H<sub>2</sub>O, biomass. Assessment of biodegradability is a key consideration in the development of biodegradable polymers.

The biodegradability of plastics is the topic of our research, so we performed some laboratory tests to assess the biodegradability of two different types of plastics (polyethylene and plastic derived from corn starch) in the presence of bacterial species, under aerobic conditions, by monitoring change in properties of polymer, CO<sub>2</sub> evolution rate and O<sub>2</sub> uptake.

**Keywords:** *bio-plastic, methods of biodegradability, microbial degradation, synthetic polymer*