Microplastics and their Alternatives for Intentional Use in Products
An application for FT-IR Micro-Spectroscopy

Bettina Liebmann
Environment Agency Austria (Umweltbundesamt GmbH), Testing Laboratory for Environmental Analysis, GMO and Fuel Analysis Spittelauer Lände 5, 1090 Vienna, Austria. bettina.liebmann@umweltbundesamt.at

Introduction

Microplastics for intentional use in products are often linked with exfoliating microbeads added to cosmetics and personal care products. However, their use extends far beyond this abrasive function and spreads across many product groups. As theoretical background we give a broad working definition of microplastics that is under discussion in the EU. We will present an overview of intentionally added microplastics, and their versatile functions in the products. The analytical perspective covers an application example of FT-IR micro-spectroscopy for microplastic analysis.

Theoretical Background

Working Definition

Microplastics are ...?

- solid plastic particles smaller than 5 mm
- made of conventional plastics e.g. PE/PP/PS/PA/PVC
- also particles of other synthetic polymers, e.g. elastomers, resins, superabsorbent polymers?
- also smaller than 1 μm (i.e. nano range)?
- bioplastic particles made from renewable feedstock?
- also water soluble and/or biodegradable particles?

Common products containing microplastics are ...?

- Voluntary initiatives of product brands to remove solid plastic particles used to exfoliate or cleanse in rinse-off personal care products are underway.

Many functions of microplastics, in products

- Exfoliating, abrasive
- Emulsifying/suspending/dispersing agent
- Film forming, surface coating, anti-static agent
- Binding, filler, control release of ingredients
- Improve chemical/mechanical resistance
- Flocculants, dewatering, absorbent

Product categories containing microplastics.

- Cosmetics, personal care products, detergents
- Paints, coatings, inks; industrial abrasives
- Agricultural and horticultural applications
- Pharmaceuticals
- Additives in waste water treatment

Conclusions & Outlook

- Small particles potentially categorizing microplastics are widely applied in consumer products for their versatile functions.
- For identification of both microplastic particles and their alternatives in products FT-IR spectroscopy was successfully applied.
- The different measurement options in FTIR provide flexibility in choosing the most appropriate method for the given analytical scope.