Summary for the final report
Method development for the qualitative and quantitative detection of microplastics in foods, causation and preventive measures (microplasticATfood)

In the IGF-CORNET project "microplasticATfood", valid methods for the non-destructive detection of microplastics (MP) in structurally simple foods (beverages, soluble foods, rinsed food surfaces) and along their production processes were developed with the aim of determining their sources and entry paths and deriving preventive measures.

Initially, general sampling protocols (SOP) were developed as guidelines for sampling in order to avoid contamination during analysis. For the quantitative analysis of MP, spectroscopic databases were generated by measuring packaging materials and producing reference MP particles. Furthermore, SOPs for sample preparation for mineral and drinking water, clear juices, wine, beer and lemonade, for water-soluble foods and for surfaces of solid foods were created to ensure contamination-free processing. The material analysis was carried out using FTIR and Raman microspectroscopy. A machine learning software was developed for the evaluation of the sample spectra measured using FTIR, which significantly accelerates this process. The GEPARD software was further developed for the Raman evaluation.

In order to ensure comparability of all results of all participating research partners (OFI, IPF, UBF) and all analytical approaches and evaluation methods used, a completely new concept for interlaboratory comparisons was developed on the basis of immobilized particles on filters. Compared to previous traditional interlaboratory comparisons, the relative standard deviation of the results was reduced from 40 to 6%. The results of all three research partners were therefore very comparable.

During the four case studies conducted in the project, over 60 food samples from the participating companies were analyzed, including samples from along the process chains. The results were presented in bilateral online meetings between the research partners and the participating companies, where the identified sources of MP and possible avoidance measures were presented and discussed.

From the results on the MP contamination of the analysed foodstuffs and on the MP sources and entry paths, it was possible to derive a number of measures for avoiding or reducing the entry of MP into these foodstuffs. These were compiled in the form of a "Catalog of measures to reduce MP in food" and made available to the food and packaging industry as well as to the manufacturers of filling systems.

The valid analysis methods developed in the project were presented at PlasticsEurope project meetings at European level and at international specialist conferences (MICRO, ICEE, SETAC, ICAVS, ISPAC) and published in specialist journals. The project was also presented at industry-related conferences such as the Freising Future Days in Germany and at official meetings such as the Federal Environment Agency's microplastics conference in Austria. During the course of the project, the freely accessible project website: https://microplastic-food.org/ was set up.

Contact was established with the standardization bodies Austrian Standards International (ASI) and International Organization for Standardization (ISO) in order to ensure that the knowledge gained from the project could be used to critically assess and comment on the drafted documents for future standards.

Overall, the CORNET project "microplastic@food" has managed to develop valid and generally accepted analytical methods for the non-destructive detection of microplastic particles (5 µm - 1 mm) in simple food matrices within 27 months. The CORNET follow-up project "MICROPLEXFOOD", which has already been approved, will further develop and apply the methods for complex foods and also increase the sample throughput through further automated evaluation.

The participating company partners from Austria and Germany were extremely involved in the project, as this gave them clear results on the MP contamination of their products and its sources. In addition, practical suggestions for avoiding or reducing MP input were developed in cooperation within the project, providing the company partners with practicable solutions and enabling them to respond much more confidently to inquiries (from the press, associations or consumers) on the subject of MP.

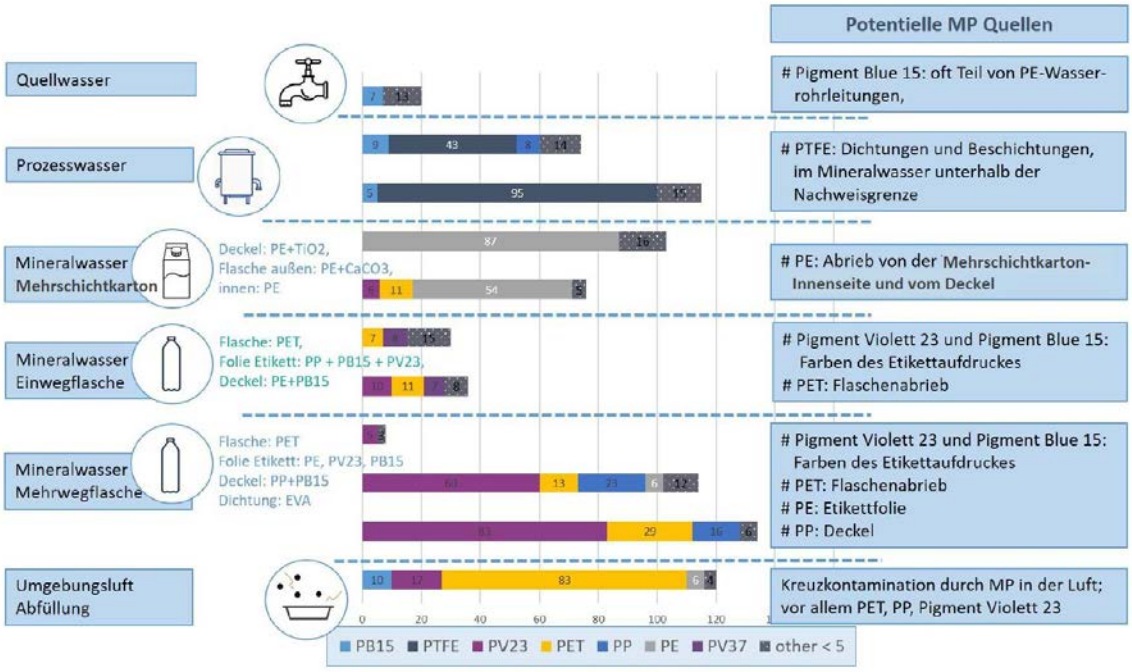

Abbildung 13: MP-Belastung entlang der Prozesskette vom Quellwasser bis zum abgefüllten Mineralwasser (Mehrschichtkarton, Ein- und Mehrweg-PET-Flaschen). Die horizontalen Balken der Grafik zeigen, welche und wie viele MP-Partikel gefunden wurden.

IVLV members can download the complete final German **project report** and the German **Catalog of measures** to reduce microplastics in food from our homepage. All you need is to register in the section “My IVLV”. Non-members can request both documents from the IVLV office at office@ivlv.org .

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