Human health and environmental impacts of food contact articles and their chemicals:

The year 2021 at FPF

Birgit Geueke

Food Packaging Forum

Research projects

AURORA

Juliette Legler

October 6, 2021, 3:40pm CET

www.auroraresearch.eu

www.cusp-research.eu

UPS Understanding Packaging Scorecard

Florian Suter

October 8, 2021, 3:10pm CET

https://upscorecard.org/

Food contact chemicals & human health (FCCH)

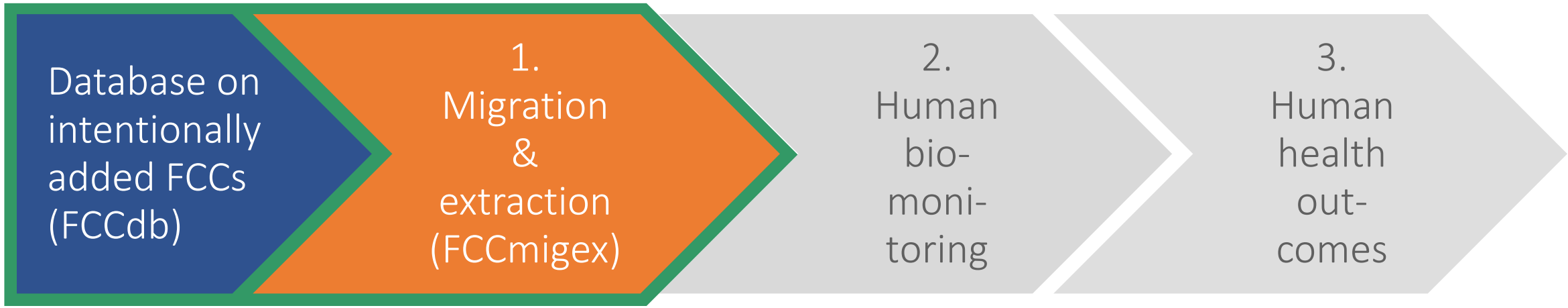
Food contact chemicals & human health (FCCH)

Food contact chemicals (FCCs)
are used to manufacture food contact materials and articles and that are present in the final article

Food contact materials (FCMs)
are used to manufacture FCAs, e.g., plastics, paper & board, metal, glass, adhesives, printing inks

Food contact articles (FCAs)
made of one or several FCMs, e.g., yogurt cup, kitchen utensils, wine glass, pizza box

Mapping the scientific evidence on
Food contact chemicals & human health (FCCH)



https://www.foodpackagingforum.org/fccdb

Groh et al. (2021) Overview of intentionally used food contact chemicals and their hazards, *DOI: 10.1016/j.envint.2020.106225*

FCCmigex database

Which **FCCs** were analyzed?

Phthalates leaching from plastic food and pharmaceutical contact materials by FTIR and GC-MS

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Abstract
Phthalates are often used as plasticizers in the production of plastic food contact materials (FCMs) and pharmaceutical contact materials (PCMs), and having in mind that they are not bound to plastics, phthalates may easily leach from plastics under certain conditions. The aim of this research is determination of phthalates leaching potential from different plastic materials and quantitative determination of 5 phthalates (dimethyl phthalate (DMP), di-n-butyl phthalate (DnBP), benzyl butyl phthalate (BBP), diethyl hexyl phthalate (DEHP), and di-n-octyl phthalate (DOP)) in 44 different plastic articles of 7 different plastic polymers used as FCMs and PCMs by FTIR, GC-MS, and gravimetric methods. The FTIR technique is shown to be rapid method for determination of phthalate content in PVC articles. Comparing of FTIR method with GC-MS and gravimetric showed that separation and quantitative determination of each phthalate separately favor the GC-MS method, because FTIR method determines the total amount of phthalate content. However, the FTIR method is less expensive and demanding in terms of sample preparation, which is suited for use in pre-screening analysis. The results of GC-MS phthalates determination showed that PVC articles used as PCMs contain DEHP in significant amount, from 5.19 to 28.76% by weight and could be a potential risk to human health.

Keywords Phthalates determination · Food contact materials · Pharmaceutical contact materials · Leaching potential · GC-MS · FTIR

Introduction

Plastic is one of the most common used materials for packaging of food and pharmaceuticals due to its excellent properties like light weight and flexibility. Although packaging is the major application filed of plastic, providing preservation of the packed food and pharmaceuticals, it is also used during production, processing, preparation of food, and pharmaceuticals, and thus, plastic is considered as common food contact material (FCM) and pharmaceutical contact material (PCM).

Plastics are made up of polymers (70–99%), macromolecules composed of a large number of repeated units, and additives which provide functionality to plastics. Additives are added to the polymers to improve the properties of the plastics, to increase elasticity, softness, flexibility, and thus reduce their fragility. Phthalates are well known and the most commonly used plasticizers.

Phthalates used as plastic additives are diesters of 1,2-benzenedicarboxylic acid (phthalic acid), whose properties depend on an aliphatic or aromatic chain that substitutes carboxylic groups of phthalic acid. The most used phthalates are dimethyl phthalate (DMP), di-*n*-butyl phthalate (DnBP), benzyl butyl phthalate (BBP), dicthyl hexyl phthalate (DEHP), di-*n*-octyl phthalate (DOP), diisononyl phthalate (DINP), and diisodecyl phthalate (DIDP). Annual production of all phthalates amounted to 6 million tons and that DEHP is the most frequently used plasticizer, with its production of up to

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Was the FCC measured in migrates or extracts of FCMs/FCAs?

Which FCA was tested?

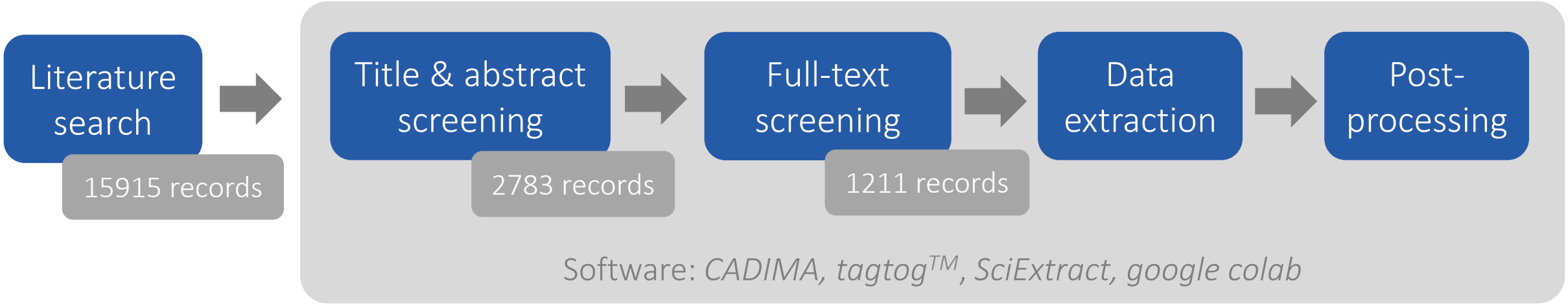
Which FCM was tested?

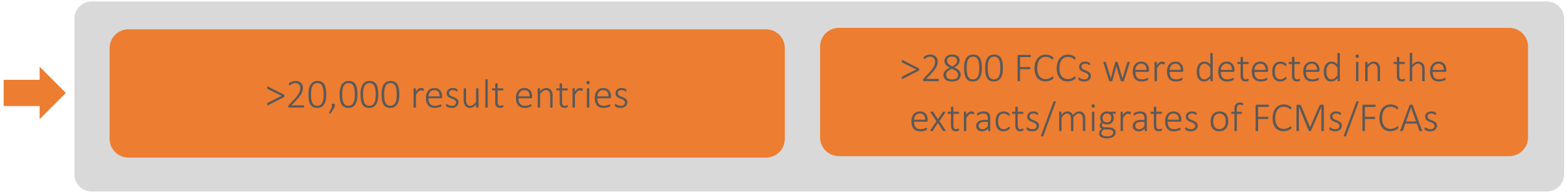
Was the FCC detected?

FCCs: name copied from original reference; CAS IDs assigned (if possible)

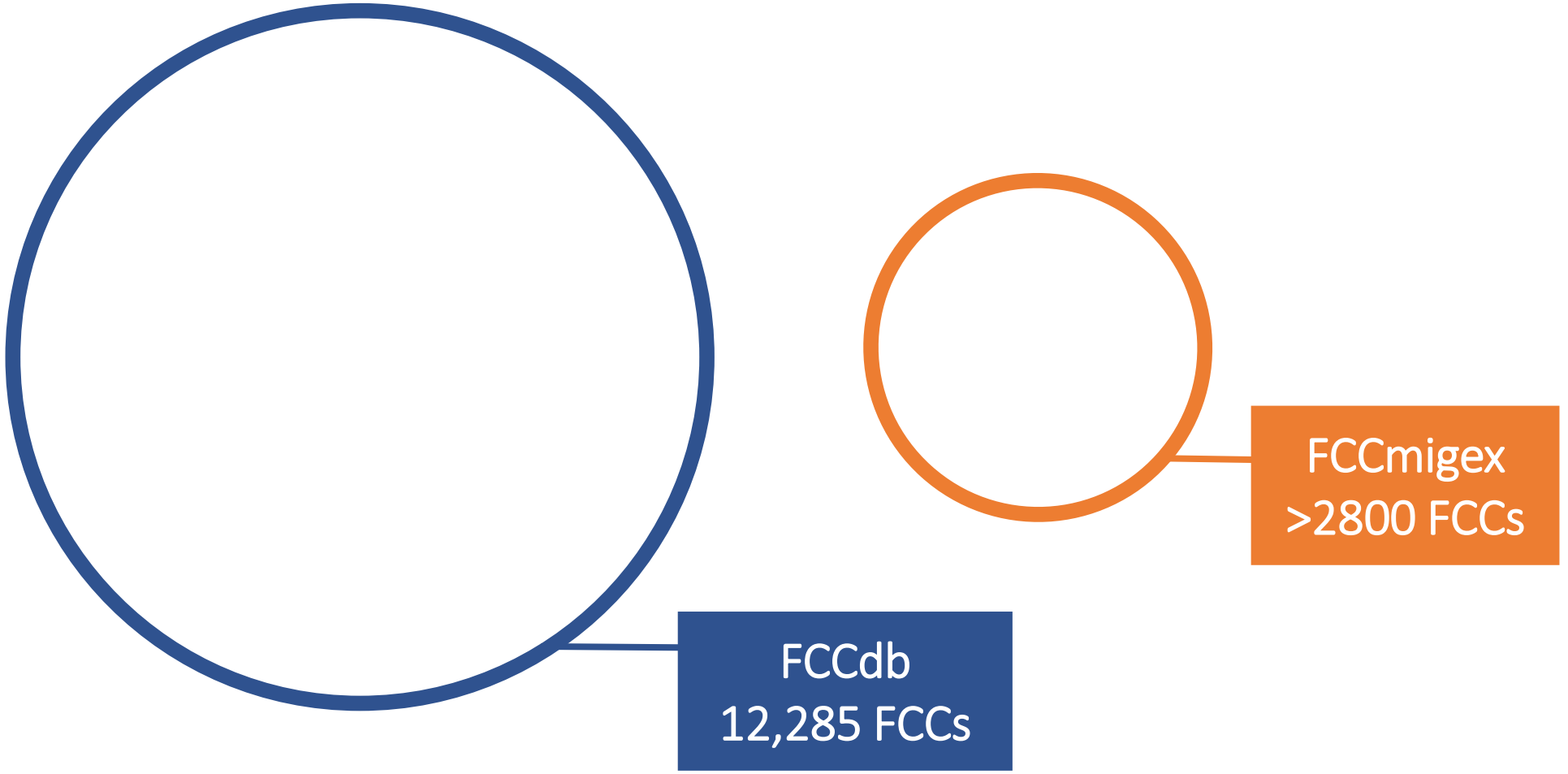
orange fields: predefined categories

FCCmigex database

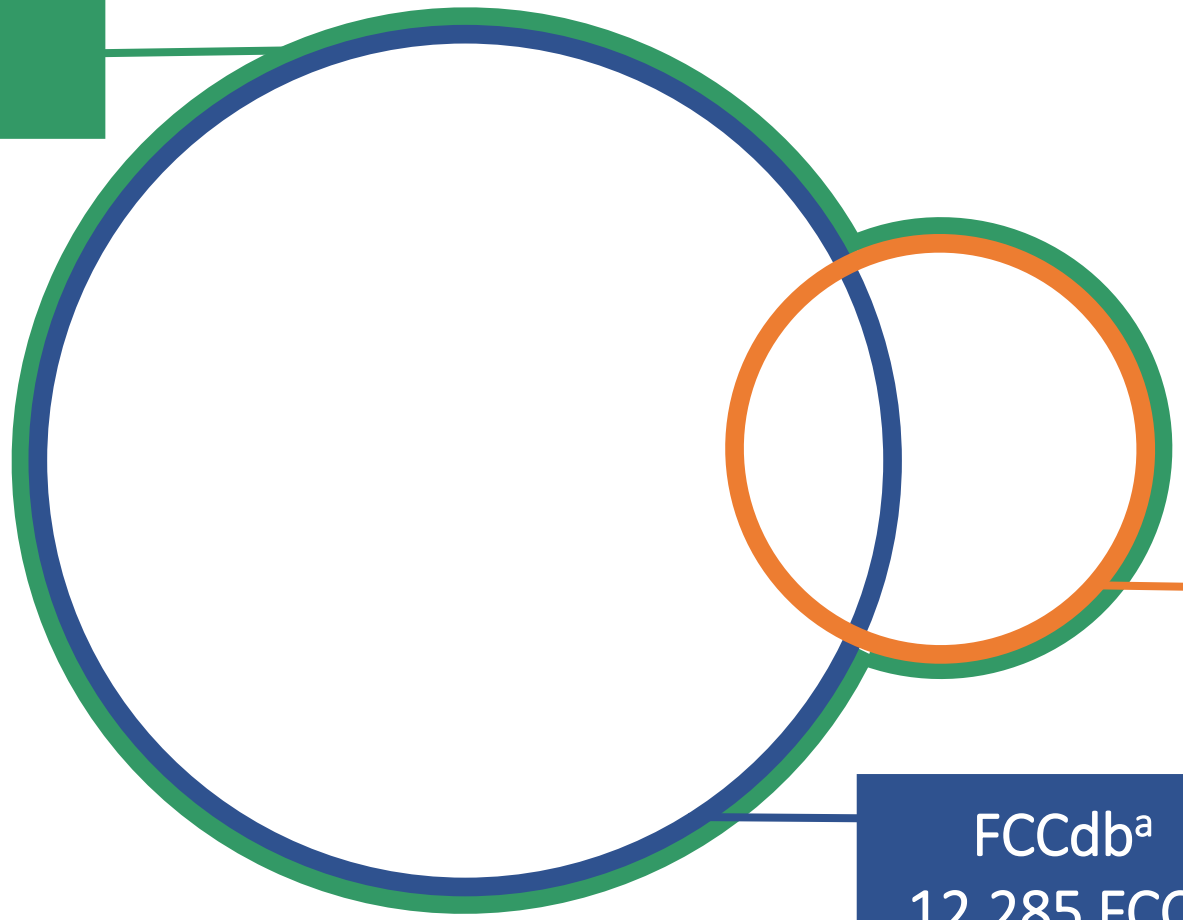




Comparison of FCCdb and FCCmigex (based on CAS IDs)



Universe of FCCs >14,000



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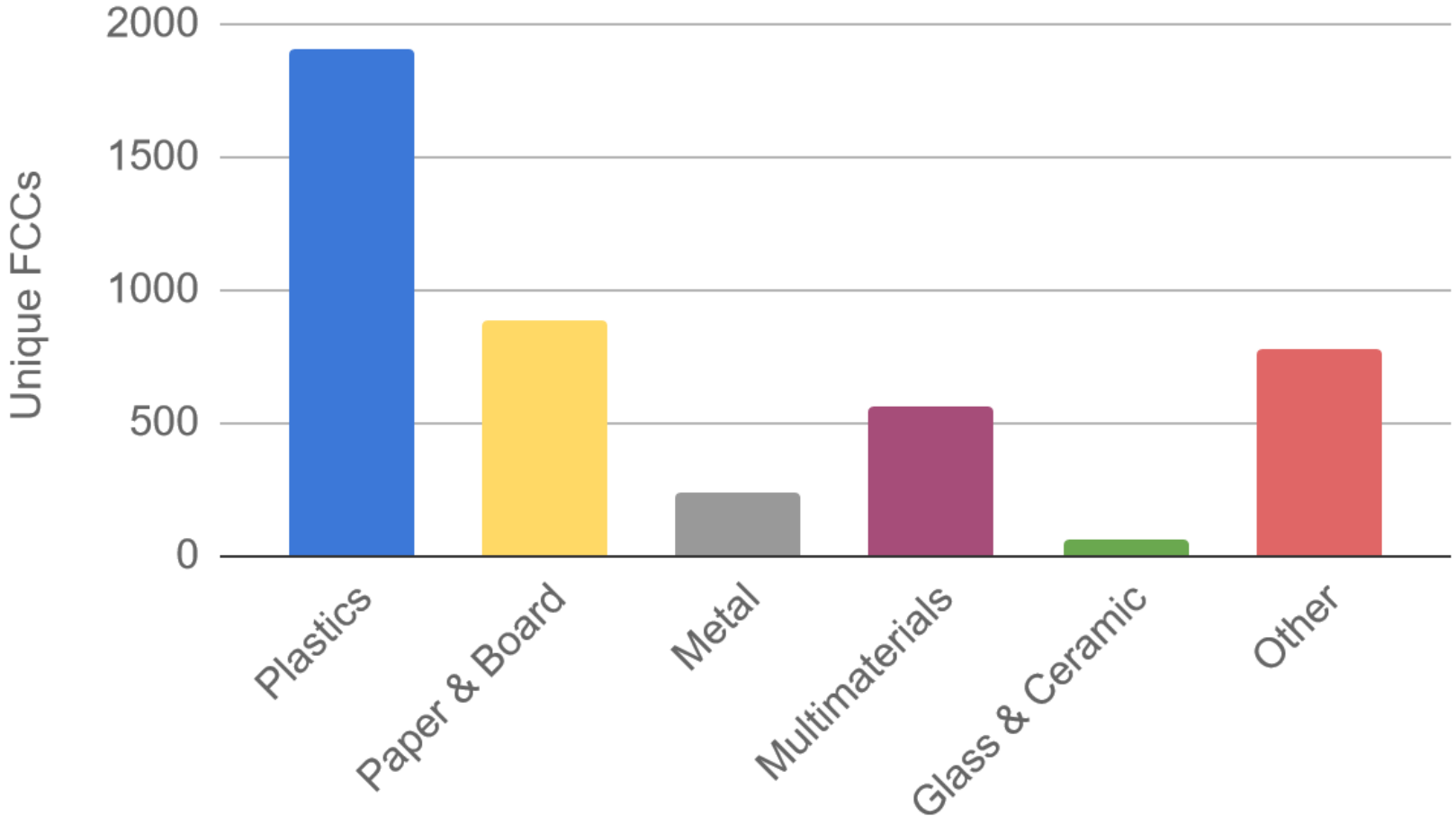
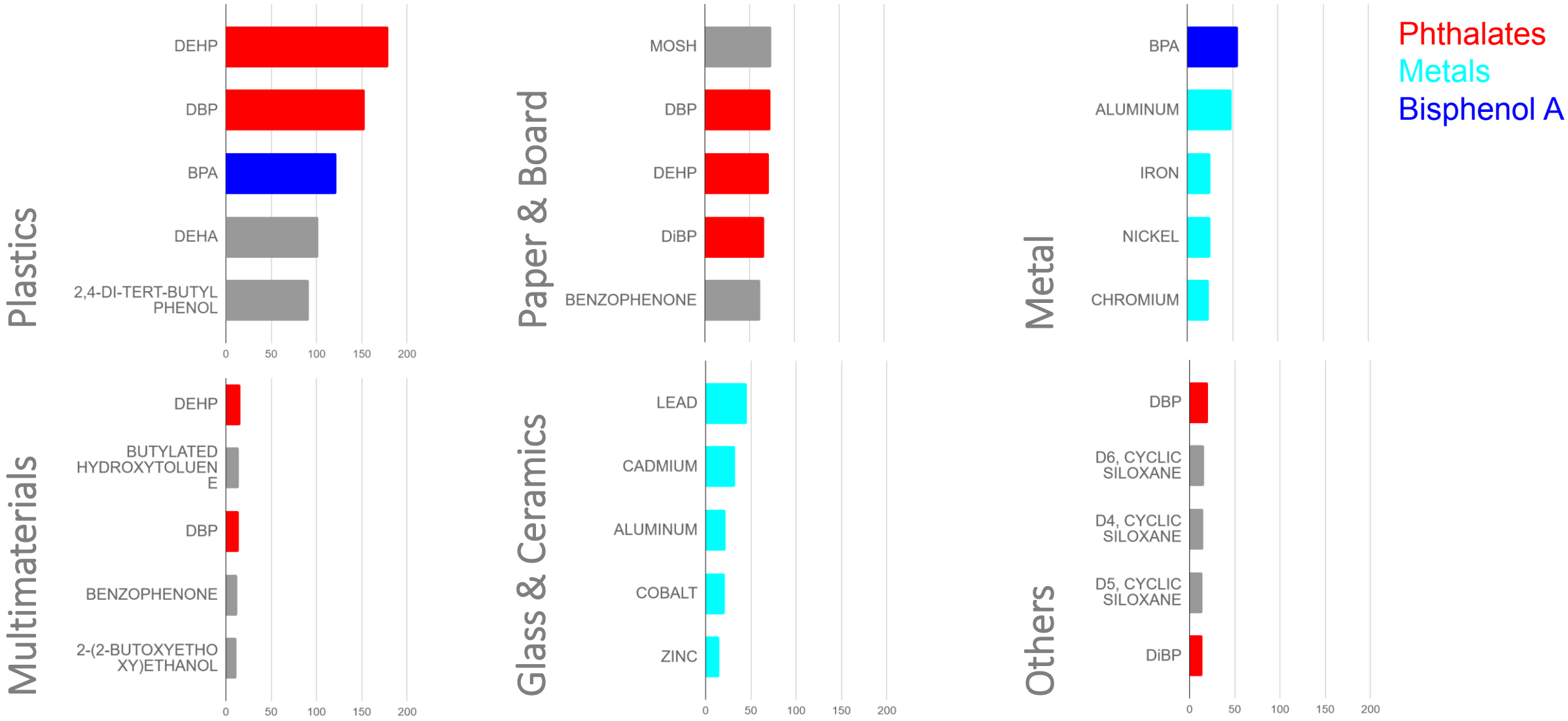
FCCs per type of FCM (detected)



TOP 5 FCCs per type of FCM (detected, result rows)



Further FPF activities

Fact sheets: Food packaging materials and recycling

www.foodpackagingforum.org/packaging-fact-sheets

Brand & retailer initiatives database

www.foodpackagingforum.org/brand-retailer-initiatives

Video blog: Unwrapping food packaging

www.foodpackagingforum.org/video-blog

The FPF news

www.foodpackagingforum.org/newsletter and www.foodpackagingforum.org/news

Fact sheets:
Food packaging materials & recycling

Learn about five food packaging material types including their applications, material properties, chemical safety, and end-of-life options; understand how recyclability and chemical safety of food packaging are interconnected

Plastic

Download

Paper and Board

Download

Metal

Download

Glass

Download

Multimaterial

Download

Brand & retailer initiatives database

- Lists over 400 voluntary initiatives and commitments by food brands and retailers
- Aim: Improving chemical safety and resource efficiency of FCMs and FCAs
- User-friendly, searchable tool

Examples:

- Restrictions on chemicals of concern
- Increased recycled content
- Reducing single-use packaging

Video blog: Unwrapping food packaging

Introducing fundamental topics and new scientific developments on food packaging and health

Presented by Dr. Jane Muncke,
the managing director of Food Packaging Forum

Episodes:

- Food packaging is safe, right?
- Are low levels of chemicals in food packaging safe?
- All chemicals that could transfer from packaging into food are well known, right?
- Reduce, reuse, recycle – when it comes to dealing with food packaging waste, it's that simple, right?
- … more to come!

The news

- >350 news articles since October 2020
- >4400 news articles freely available and searchable (since 2012)

- You are welcome to continue using this resource for your daily work and research
- Please register for the newsletter

Jon S, Newspaper B&W, flickr

THANK YOU

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