Title:
The contamination of food by recycled paper and board packaging starts at the scale of fibers.

Authors et affiliations:
Lucas Biant[1], Julien Kermorvant[1], Murielle Hayert[1], Phuong-Mai Nguyen[2], Olivier Vitrac[1]

1. UMR SayFood 0782, Université Paris-Saclay, INRAE, AgroParisTech, 91120, Palaiseau, France
2. Laboratoire National de Métrologie et d'Essais (LNE), 78190, Trappes, France

Abstract:
Food packaging contamination has become a significant concern due to implementing circular economy practices, including the increased use of recycled materials. Although the contamination of paper and board is widely studied, the current techniques show limitations in accurately quantifying and characterizing certain types of contaminants (e.g., mineral oil hydrocarbons). Moreover, very few studies have targeted the causes and effects of this contamination. This study uses chemical imaging as a novel method to investigate the contamination of food packaging materials made of recycled paper and board at the microscopic scale. The contamination of commercial packaging is explored, while reference materials and model solutes are used to develop the method that provides a heat map of contaminants distribution at the fibers' scale. The main findings highlight the heterogeneous distribution of contaminants within the paper matrix, with variations influenced by the nature of the contaminant and solvent used. This research emphasizes the need to develop analytical methods to enhance their accuracy and reliability. By exploring the root causes of contamination, this work contributes to improving the safety and quality of food packaging materials in a circular economy.