

Single particle ICP-MS as an essential tool for characterizing the agglomeration behaviour and fate of food-grade titanium dioxide in human gastrointestinal digestion

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The fate of nanomaterials during human digestion is poorly understood. Indeed, particle interactions with the gastrointestinal (GI) environment may alter the physicochemical properties of ingested particulate materials and affect the intestinal uptake of the particles and their toxicological properties. In this study, we used in chemico methods for fate testing of food-grade titanium dioxide (E 171) under GI conditions. A representative sample of E 171 was submitted to physicochemical characterization using a state-of-the-art multi-technique approach and its GI fate was studied by applying the in vitro GI digestion approach laid down in the EFSA guidance on risk assessment of nanomaterials, in both fasted and fed conditions. In addition, actual E 171-containing food samples were studied. Single particle ICP-MS was the key technique in this study to characterize the agglomeration behaviour of E 171 and the obtained results showed that light scattering techniques used in earlier studies delivered biased result.