

Detection and characterization of silver nanoparticles in chicken meat by asymmetric flow field flow fractionation with detection by conventional or single particle ICP-MS - DTU Orbit (09/11/2017)

Detection and characterization of silver nanoparticles in chicken meat by asymmetric flow field flow fractionation with detection by conventional or single particle ICP-MS

A method of analysis of silver nanoparticles (AgNPs) in chicken meat was developed. The homogenized chicken meat sample, which was spiked with AgNPs, was subjected to enzymolysis by Proteinase K for 40 min at 37 °C. Transmission electron microscopy and inductively coupled plasma mass spectrometry (ICP-MS) in single particle mode were used to characterize the number-based size distribution of AgNPs in the meat digestate. Because similar size distributions were found in the meat digestate and in the aqueous suspension of AgNPs used for spiking the meat, it was shown that no detectable dissolution of the AgNPs took place during the sample preparation stage. The digestate was injected into the asymmetric flow field flow fractionation (AF(4)) -ICP-MS system, which enabled fractionation of nanoparticles from the remaining meat matrix, and resulted in one large peak in the fractograms as well as two smaller peaks eluting close to the void volume. The recovery of silver contained in the large AgNP peak was around 80 %. Size determination of AgNPs in the meat matrix, based on external size calibration of the AF(4) channel, was hampered by non-ideal (early elution) behavior of the AgNPs. Single particle ICP-MS was applied for determination of the number-based particle size distribution of AgNPs in collected fractions. The presented work describes for the first time the coupling of AF(4) and ICP-MS for AgNP separation in a food matrix.

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