ESRF	**Experiment title:** Quantitative Localization of Dendrimer-Modified Iron Oxide Nanoparticles in Cancer Cells by 3D Tomography and High Resolution X-ray Fluorescence Imaging	**Experiment number**: SC-4855
Beamline: ID16A	**Date of experiment**: from: 07.11.2018 to: 10.11.2018	**Date of report**: 25.02.2020
Shifts: 9	**Local contact(s)**: Dr. Peter Cloetens	*Received at ESRF:*

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Report:

Iron oxide nanoparticles (IONPs) have widely been used as T2 contrast agent for magnetic resonance imaging (MRI). They are of particular interest as biodegradable and non-toxic nano-materials compared to other contrast agents families such as macromolecular chelates of gadolinium. Regarding therapy, IONPs are also developed for magnetic hyperthermia for thermally-induced release of drugs or for radiosensitization.

The goal of the proposed experiment is to extend our strategy to unravel how the dendronized IONPs are internalized inside the target cells by the combination of magnified phase imaging (both 2D projection and 3D tomography) and scanning X-ray fluorescence at ID16A. We have used spherical IONPs coated with ethylenglycol-based dendrimers synthesized by D. Felder-Flesch (Strasbourg).

Figure 1 shows K (upper) and Fe (lower) signals collected from the mouse melanoma cells incubated with IONPs (Φ = 20 - 30 nm) at t = 3 h. The obtained images suggested that some particles are accumulated near the nucleus, while others near cell-cell junctions. Unfortunately, we suffered from artifacts due to incomplete washing of intact particles in th ebulk phase. We had difficulties to nail down whether particles are on the membrane surface or in bulk phase, because the melanoma cells were too large to be subjected to 3D tomography. Towards the next experiments we try to further improve the sample preparation prior to the cryofixation in order that we are able to localize the IONPs in/on cells.

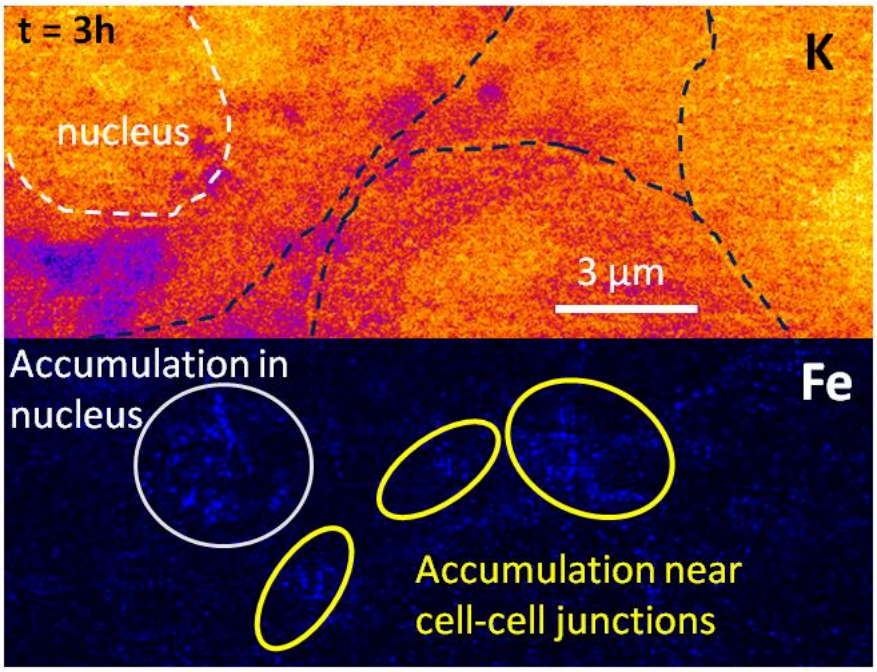

Figure 1. K (upper) and Fe (lower) signals collected after 3 h of particle incubation.