


Experiment Report Form

 <p>ESRF</p>	<p>Experiment title: Study of the intracellular degradation of magnetosomes in 3D human lung carcinoma models and macrophages</p>	<p>Experiment number: LS 3198</p>
<p>Beamline: ID16B</p>	<p>Date of experiment: from: 21st July 2023 to: 24th July 2023</p>	<p>Date of report: 18 September 2023</p>
<p>Shifts: 9</p>	<p>Local contact(s): Madeleine Han</p>	<p><i>Received at ESRF:</i></p>
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Report:

Magnetosomes are magnetite (Fe₃O₄) nanoparticles (≈40 nm size) synthesized by magnetotactic bacteria. They are being studied for biomedical applications such as magnetic hyperthermia for cancer treatment or localized drug delivery via magnetic field guiding. Our group is studying the long-term degradation of magnetosome inside three-dimensional tumour models, an essential step for any clinical research involving magnetosomes. It should be noted that this experiment was a continuation of ESRF BM23 LS-2922, the results of which we recently published in Gandarias et al. (Biotechnology Journal, 2023).

For this experiment at ID16B, we generated 3D tumour models of human lung carcinoma cells loaded with magnetosomes in our home institution, and fixed them with glutaraldehyde at different times during the degradation process. The spheroids were then embedded in epoxy resin (C₂₁H₂₅ClO₅) for the generation of

100-200 nm thin sections. The thin sections were then placed into a silicon nitride (Si₃N₄) membrane of 5 x 5 mm² length and 50 nm thickness.

At the ID16B beamline, the measurements were carried out in fluorescent mode, and depending on the Fe content of the area being measured, we performed 2-10 scans for each region. We tried two different experimental set ups: one using the cryostat, to analyse the samples at 10K, and another one at room temperature, and decided to perform most of the experiment at room temperature, as this allowed us to use a higher number of fluorescence detectors.

No incidences occurred during the experiment. We are analysing the data and expect to publish the results soon.