

Practicals

N°63: Vibrating magnetic nanoparticles as a tool to influence cell fate.

Teachers:

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Magnetic nanoparticles are a very efficient way to remotely exert forces and torques at the nanoscale on living cells. They were shown for instance to physically destroy glioblastoma cancer cells or trigger their apoptosis thanks to the low frequency vibrations of nanoparticles in contact with the cells. Then vibrating magnetic nanoparticles appear as an interesting tool to perturb cell programs.

The goal of the practical is to design magnetic nanoparticles with well controlled shape and observe their interaction with glioblastoma cells in vitro. In particular, we will qualitatively observe nanoparticles in cells using video-microscopy. We will then evaluate how they may drive to cell death. By applying an alternating magnetic field, we will observe change in cell shape induced by their vibrations induced.

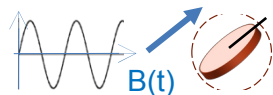
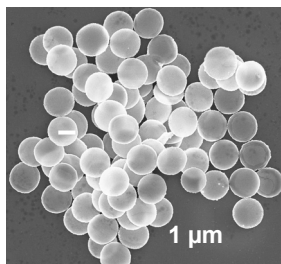


Fig1. SEM image of NiFe nanodisks; Sketch of their magnetic actuation (P1)

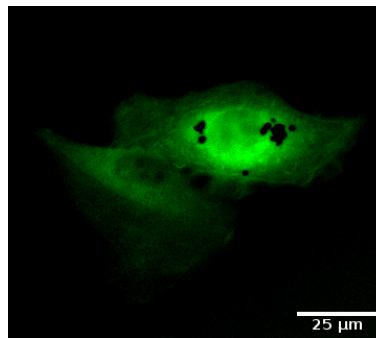


Fig2. Fibroblast cells interacting with the nanodisks. Green : actin staining.

S. Leulmi et al., *Nanoscale*, 2015, 7, 15904–15914. <https://doi.org/10.1039/C5NR03518J>

C. Naud et al., *Nanoscale Adv.*, 2020, 2, 3632–3655. <https://doi.org/10.1039/D0NA00187B>

C. Thébault et al., *Nanoscale Adv.*, 2021, 3, 6213–6222. <https://doi.org/10.1039/D1NA00461A>