Final Report Summary - OPTIMAG

The project called *"Optimization of Fe-ETM-Nb-B (ETM or Early Transition Metal = Cr, Ti, Mn) magnetic particle production technologies for cancer therapy"* led to the development of a complex technology for obtaining nano/microparticles by high-energy ball milling of the amorphous ribbons obtained by rapid cooling of the melt from the alloys with the mentioned compositions.

The key point of this technology is the preservation of the amorphous state in the magnetic particles, as it is achieved in the melt-spun ribbons, characteristic that determines the specific magnetic properties required by medical applications in cancer therapy.

In the framework of this project, we have confirmed the technological elements and did all the necessary tests to produce in a highly reproducible manner micro- and nanoparticles for applications in cancer therapy through hyperthermia, magneto-mechanical actuation, drug delivery and particle transfer.

Fig. 1. presents an illustration of the technological steps involved in the preparation of Fe-ETM-Nb-B particles with sizes ranging from 10 nm to 1 μm, while in Fig. 2 are shown images that highlights the effect of magneto-mechanical actuation on the viability of human osteosarcoma cells (HOS).

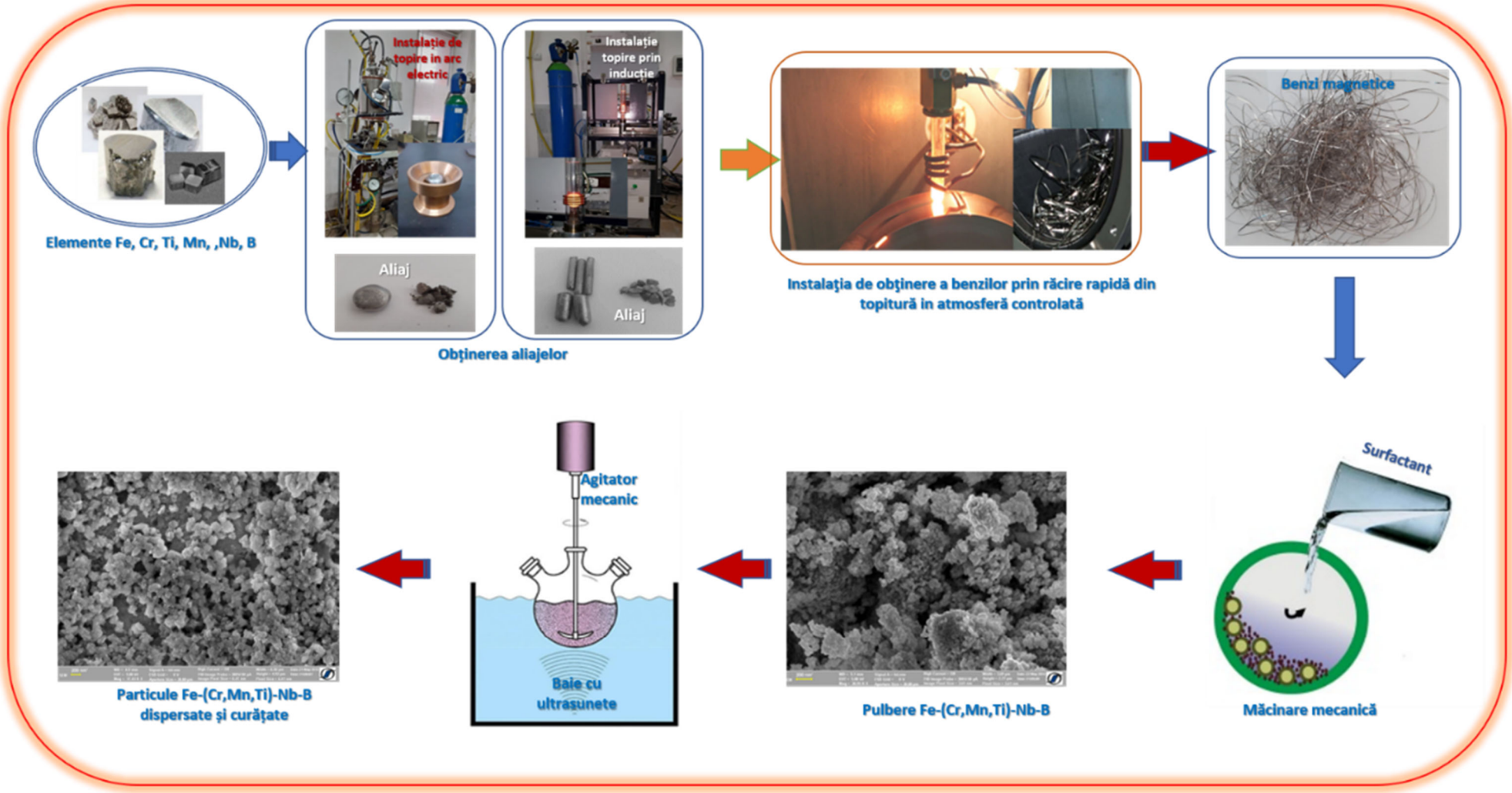

Fig. 1. Schematic representation of the process to obtain Fe-ETM-Nb-B magnetic particles in the laboratory.

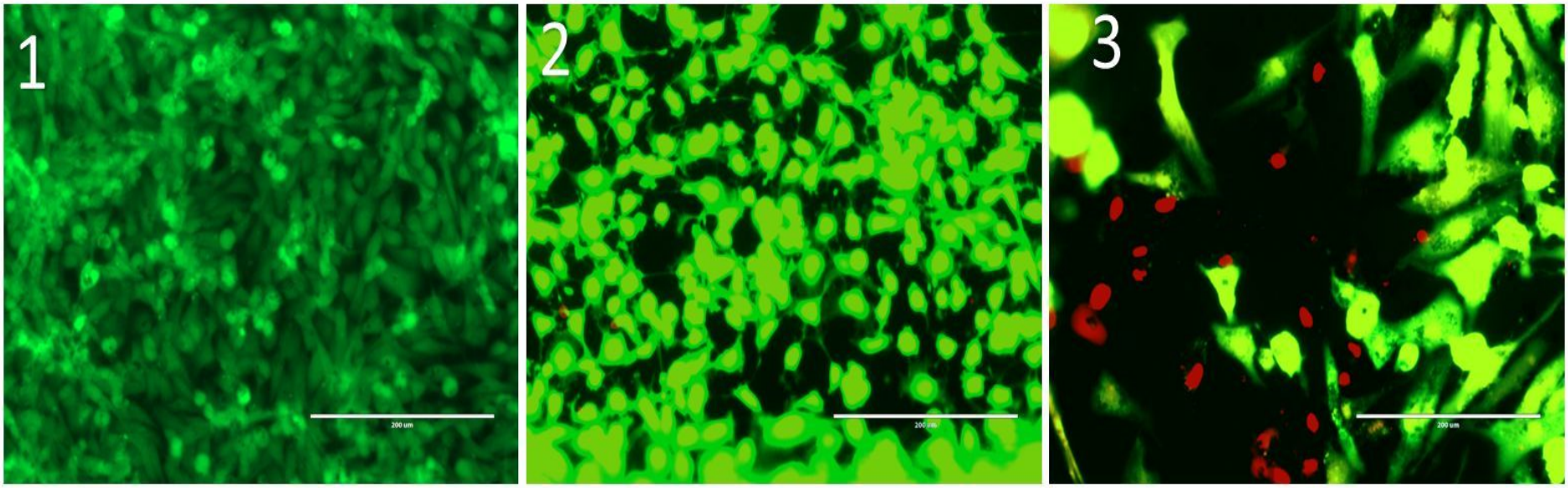

Fig. 2. Fluorescent images of Fe-ETM-Nb-B nanoparticles loaded on human osteosarcoma cells (HOS), obtained by using the Live/Dead assay. The magneto-mechanical actuation destroys the cancer cells, reducing the number of live cells (colored in green) and increasing the number of dead cells (colored in red).
1 - Cancer cells, before treatment.
2 - Cancer cells after the addition of magnetic particles, during the magneto-mechanical actuation treatment.
3 - Cancer cells after magneto-mechanical actuation.