



Heatable PLA/CaP scaffolds for bone therapy through electromagnetic induced hyperthermia of iron oxide nanoparticles

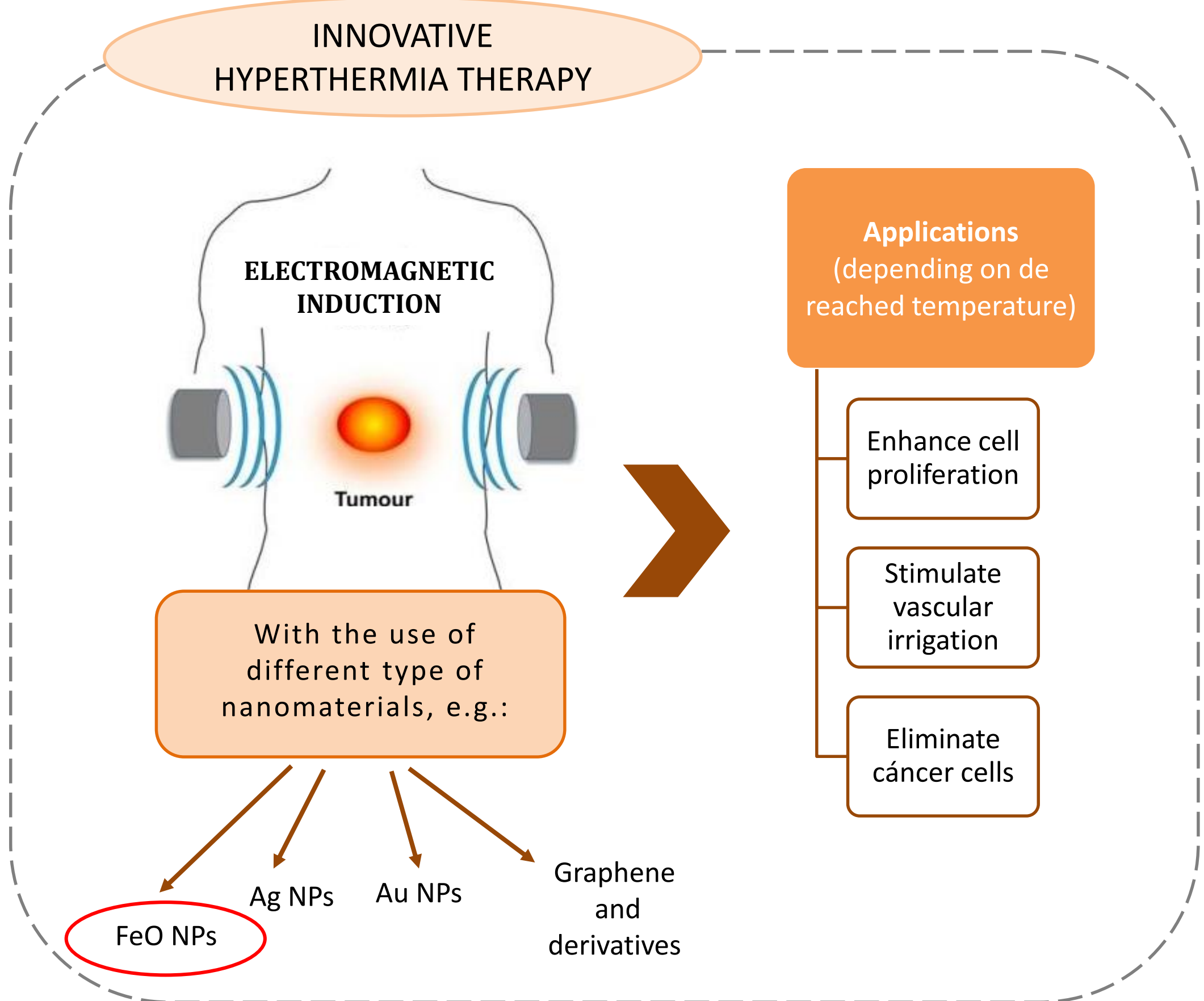
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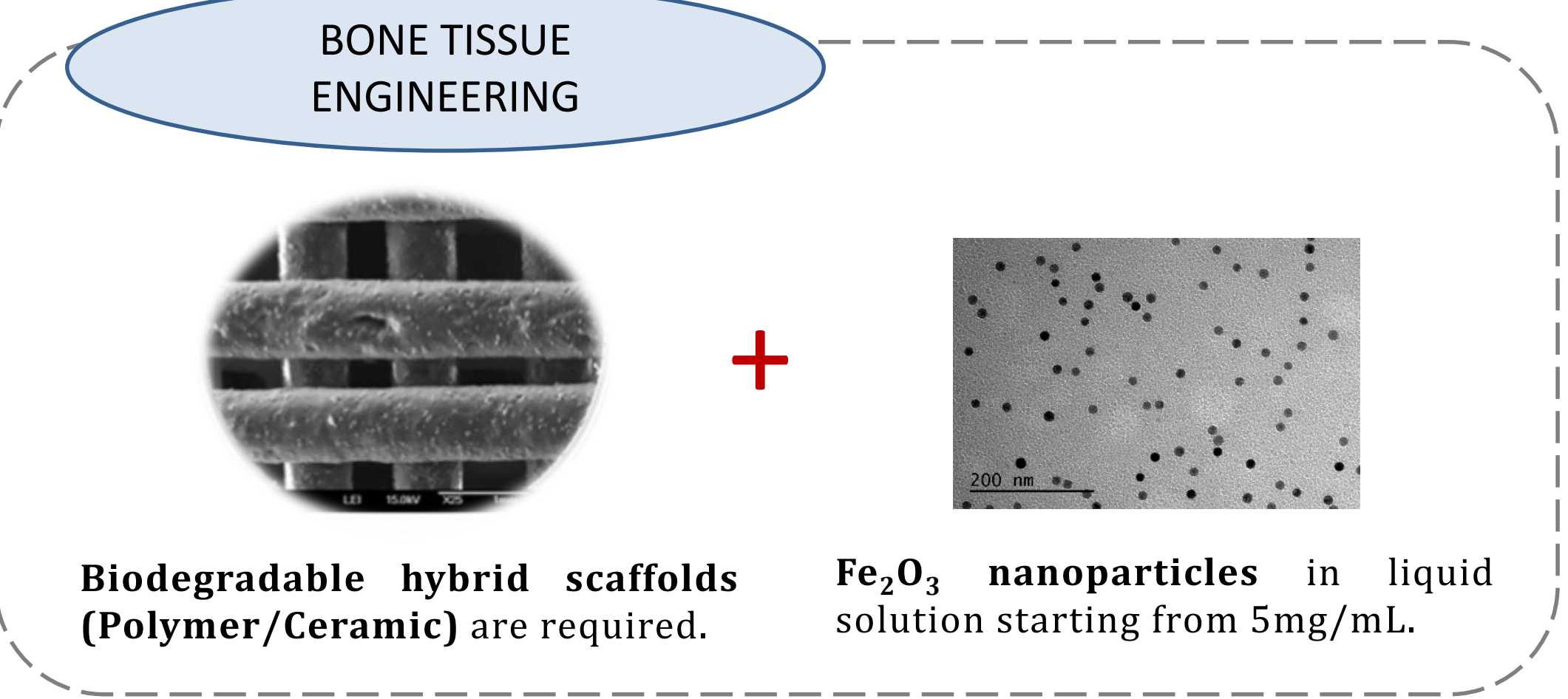


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Introduction



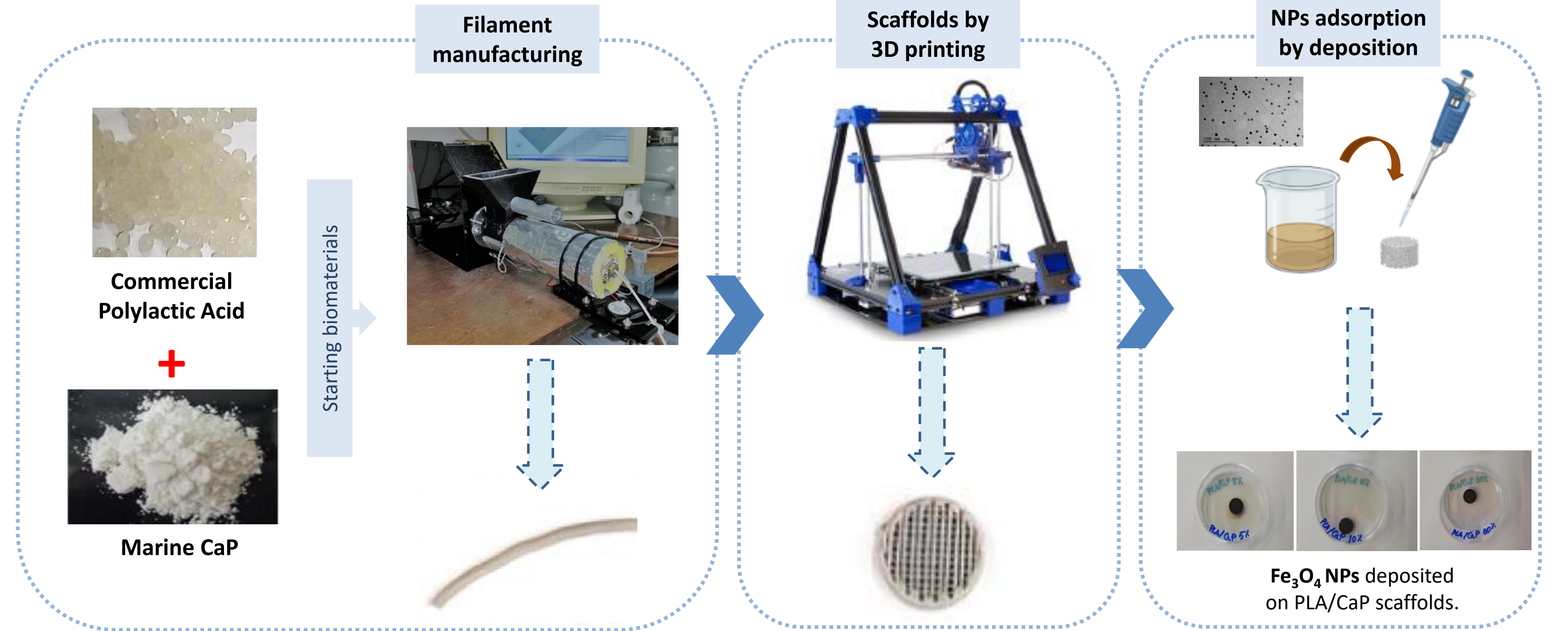
Aim



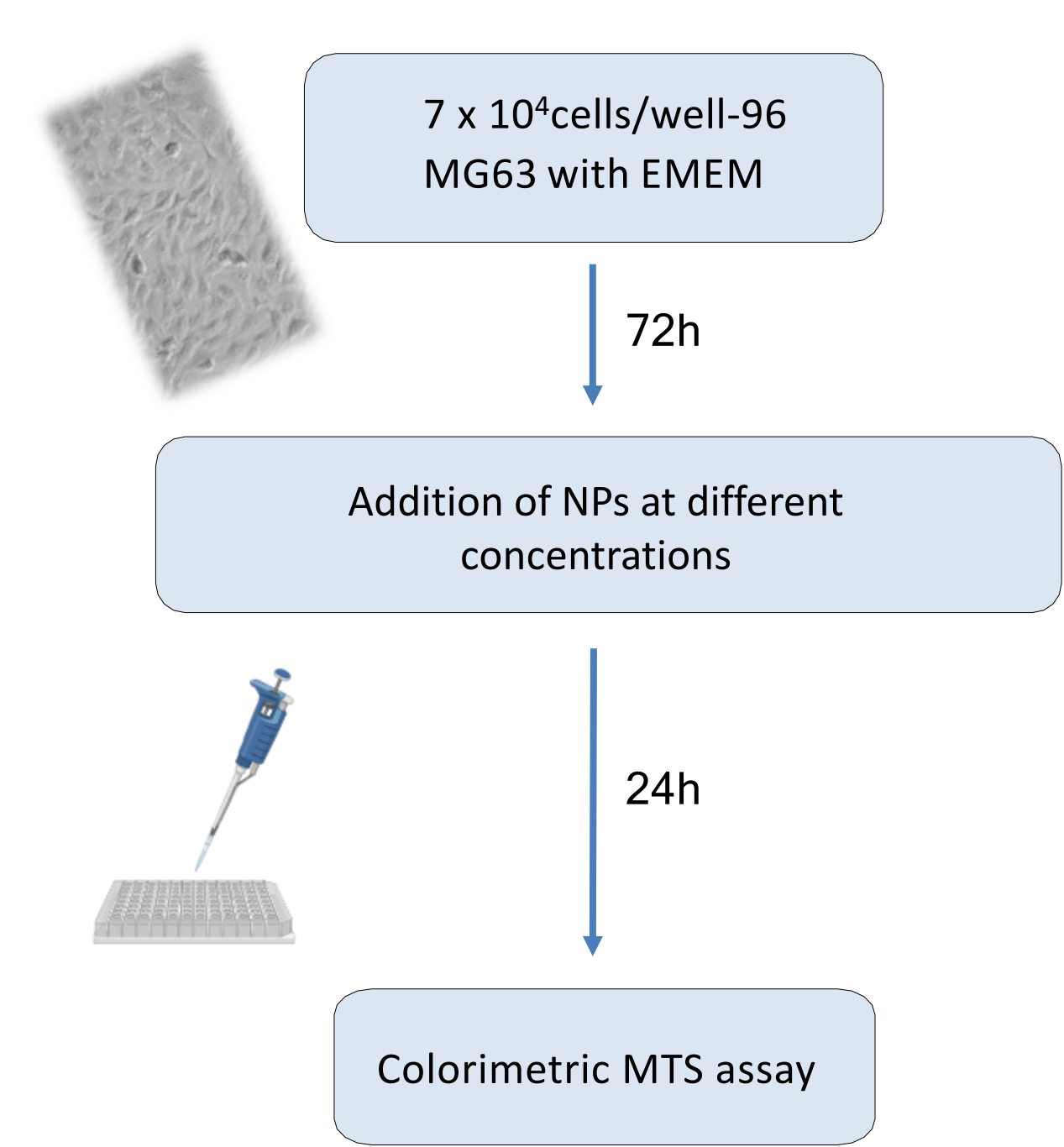
Our purpose is to develop CaP/PLA heatable scaffolds to cause hyperthermia by using embedded iron oxide nanoparticles.

Materials and Methods

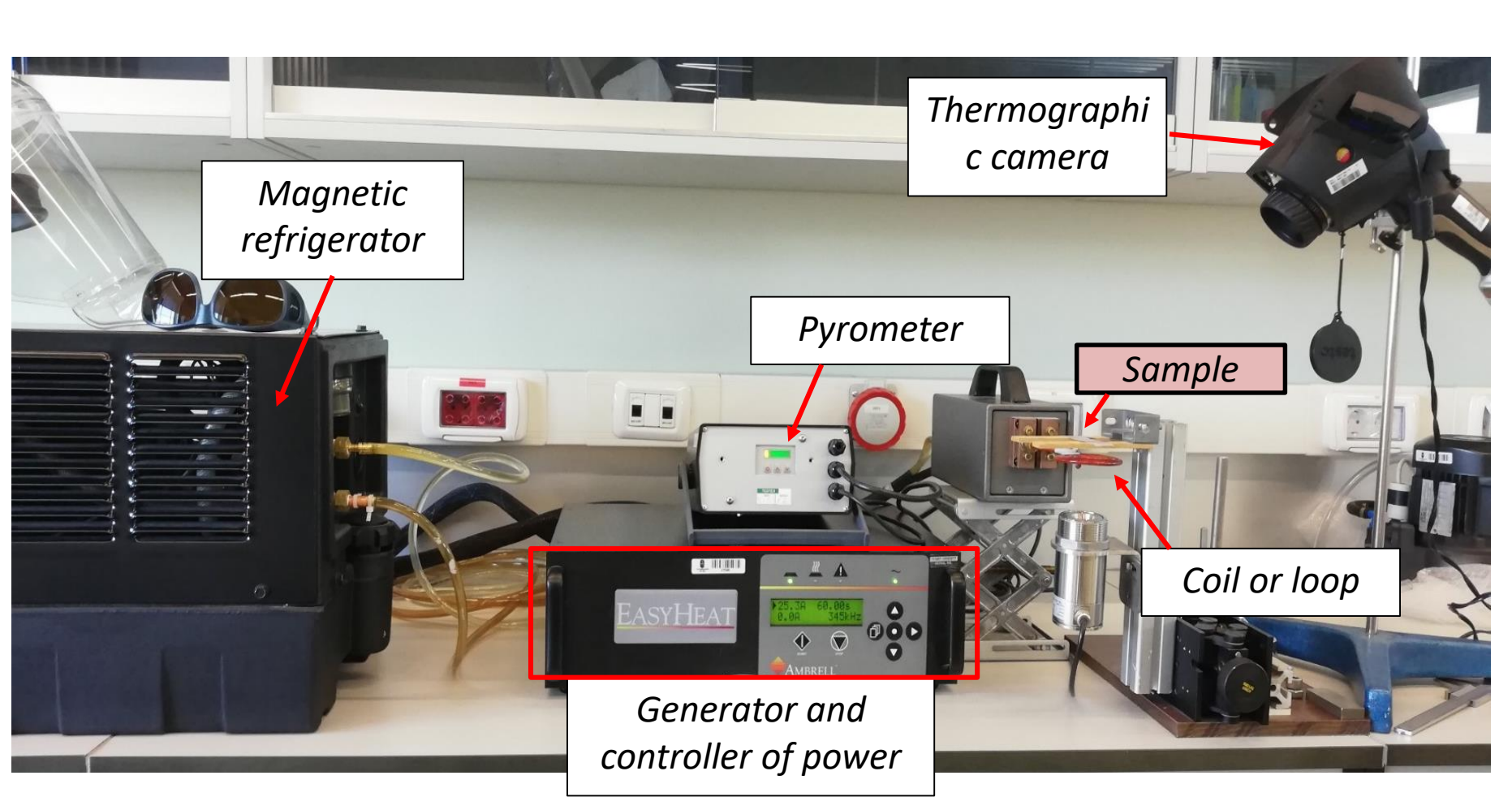
Scaffolds manufacturing



Citotoxicity assay

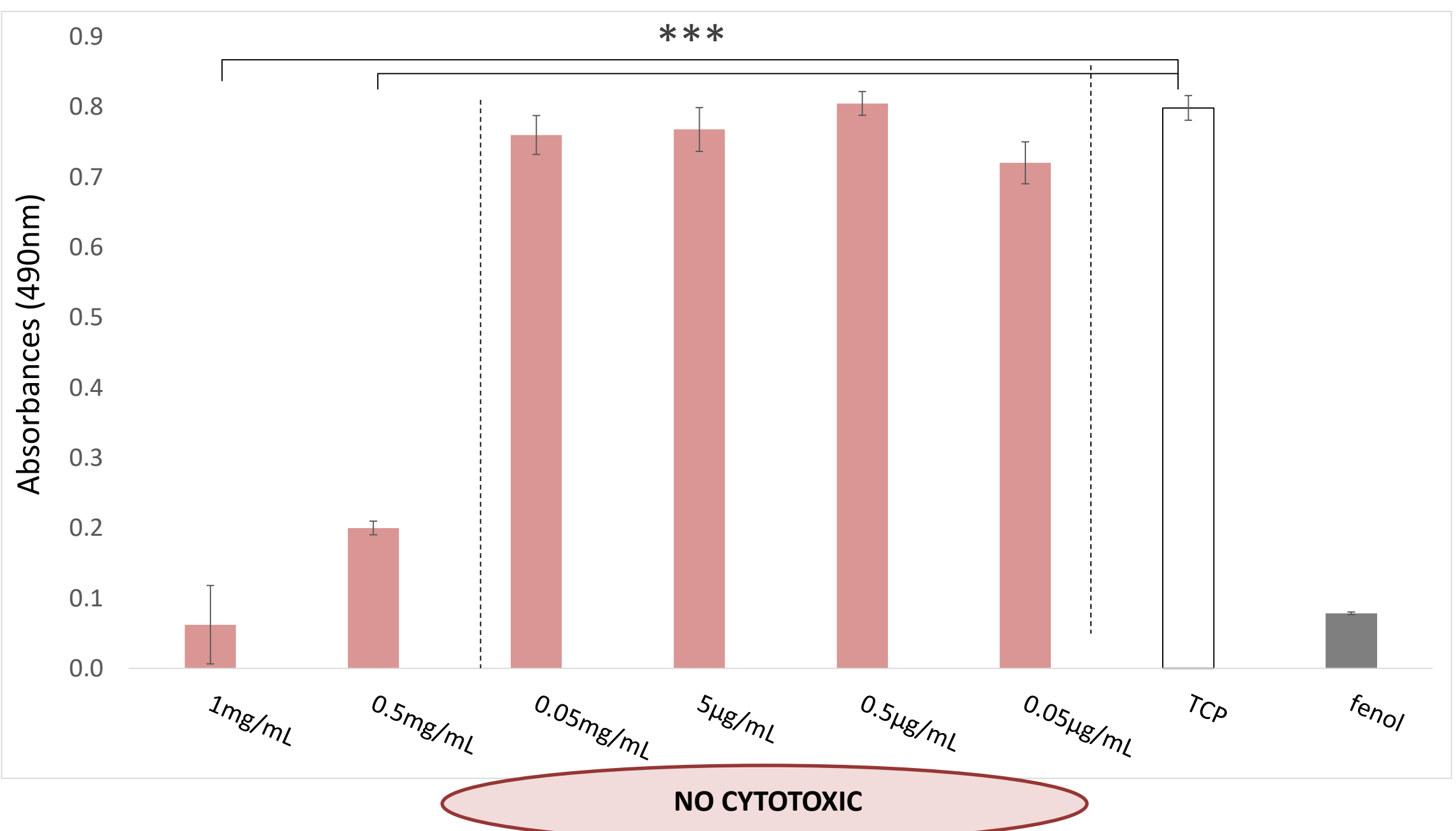


Electromagnetic induction equipment



Parameters: Exposition time (all cases) of 120 seconds
Current intensity between 60,5 - 99,0 A

Biocompatibility



Cell viability percentages

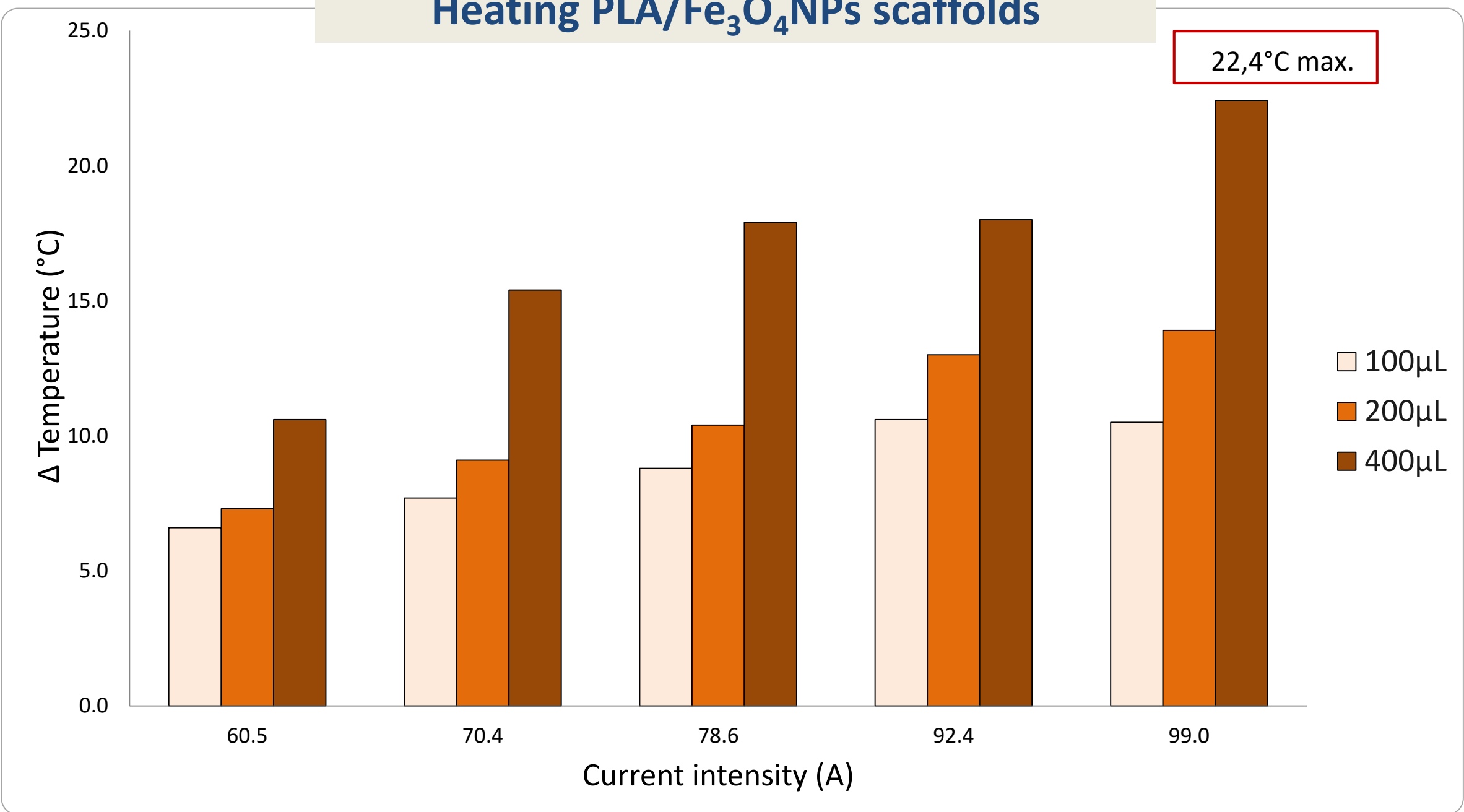
NPs concentration (mg/mL)	1	0.5	0.05	5x10 ⁻³	5x10 ⁻⁴	5x10 ⁻⁵
Viability rate (%)	8%	25%	95%	96%	100%	90%
Citotoxicity scale value	4	4	0	0	0	0

In vitro biocompatibility tests demonstrate a threshold of non-toxicity for Fe₃O₄ NPs concentrations below 0.05mg/mL.

Results

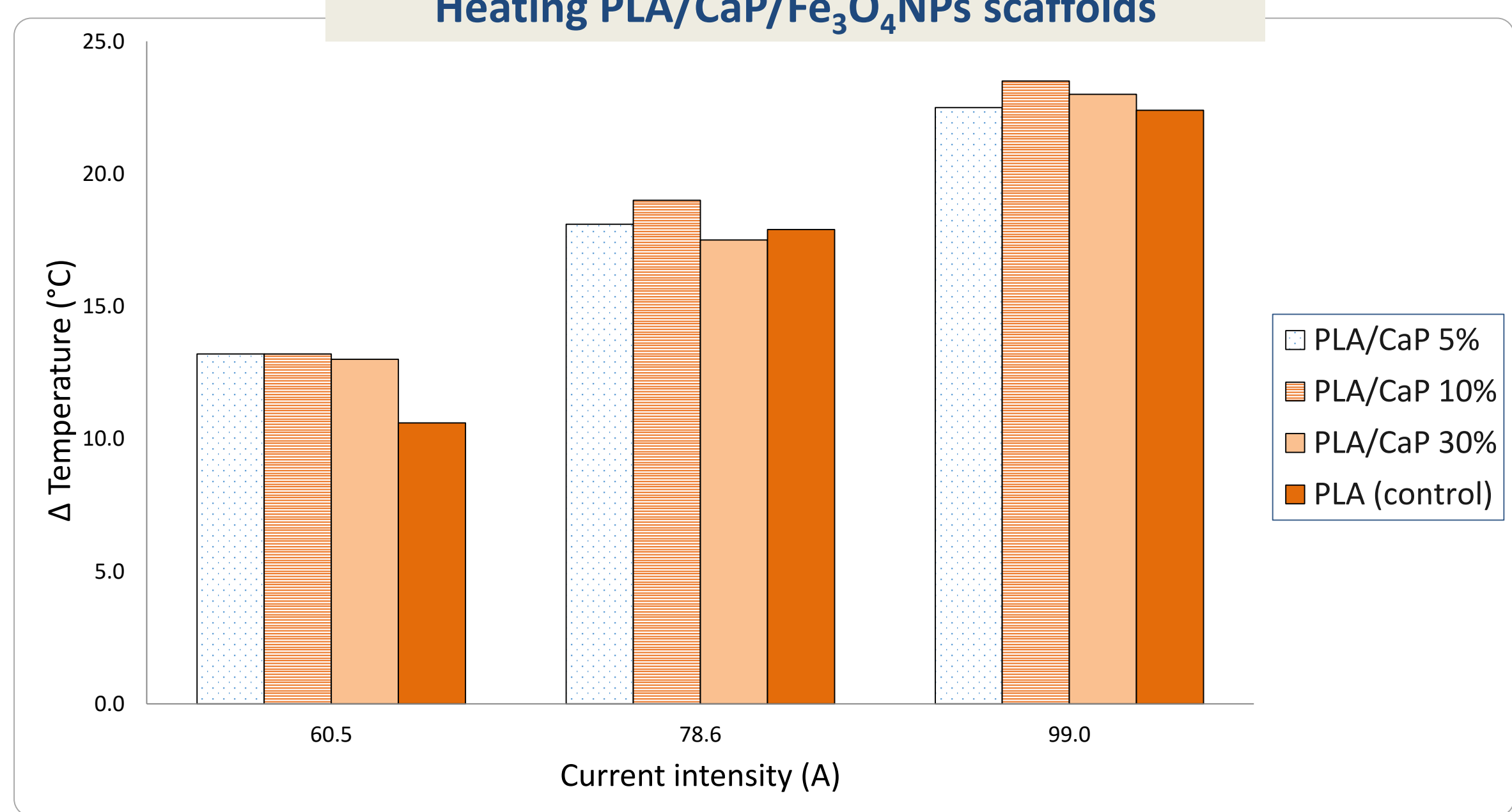
Hyperthermia Experiments

Heating PLA/Fe₃O₄NPs scaffolds



Temperature increases as a function of the quantity of nanoparticles and the applied intensity.

Heating PLA/CaP/Fe₃O₄NPs scaffolds



Hyperthermia induced on the scaffolds can be tuned by selecting the appropriate current of the inductor. No differences are observed with a CaP weight percentage up to 30%.

Conclusions

The biocompatible concentration threshold of Fe₂O₃ nanoparticles has been determined. The generation of local hyperthermia in PLA/CaP/Fe₃O₄NPs scaffolds by electromagnetic induction has been demonstrated.

Acknowledgements



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