

Obtaining SAR vs Field intensity or SAR vs Applied frequency in one single experiment

How to benefit from the magneTherm full range of frequencies and corresponding field intensities

It is important to test one parameter when related parameters are kept constant in order to elucidate the effect of that particular parameter in magnetic fluid hyperthermia related experiments. The versatility of settings within the magneTherm system, especially its extensive range of frequencies and variable field intensities allow such sequence experiments to be performed over a lengthy period with minimal user interference.

One Example of such experiments is as follows:

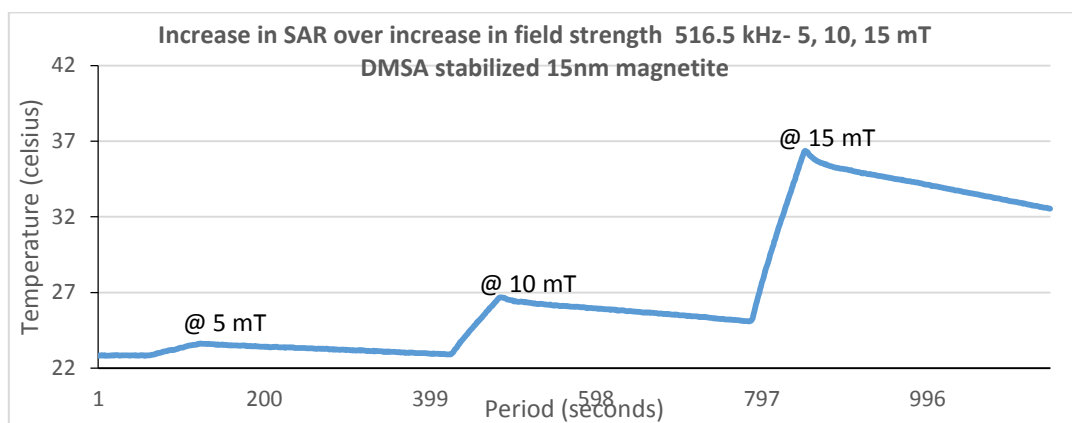
Specific Absorption Rate vs Field intensity in a single experiment

This is a proof of principle experiment to show that magneTherm allows the user to study the relationship between specific absorption rate (SAR) and applied field intensity in magnetic nanoparticle (powder or suspension form) calorimetric heating experiments.

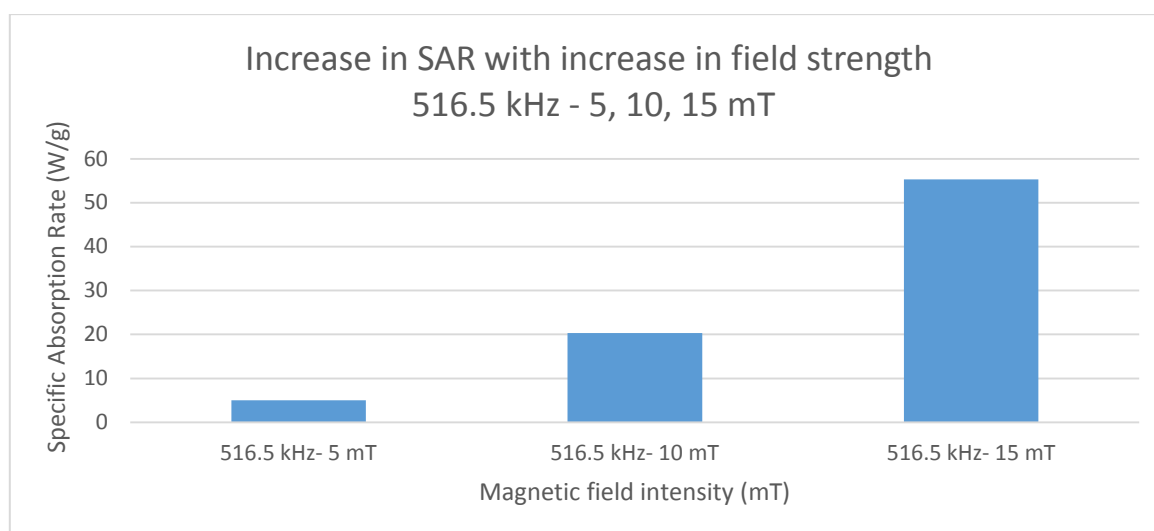
In this experiment 2 ml of 15 nm sized DMSA stabilized magnetite nanoparticle suspension was exposed to increasing field intensities of 5, 10 and 15 mT at a fixed frequency of 516.5 kHz.

The experiment starts with a one minute stabilizing period for the sonicated magnetic nanoparticle sample to stabilize to the ambient temperature within the insulated adiabatic shield followed by exposure to one minute of 5 mT field intensity, the sample is then then allowed to cool at zero field intensity for 5 minutes, this is then followed by exposure to one minute of 10 mT field intensity then allowed to cool at zero field intensity for 5 minutes, finally exposure to one minute of 15 mT field intensity, then allowed to cool at zero field intensity for 5 minutes.

To compare the obtained SAR values it is important that the each field intensity setting should start at a similar temperature range, this is the main reason for introducing the zero field intensity step to get an accurate SAR value for each field intensity setting.



Rate of change of temperature of the magnetic nanoparticle at varying field intensity with a constant alternating frequency



Rate of change of SAR of the magnetic nanoparticle at varying field intensity with a constant alternating frequency

The mARCS (magneTherm Absorption Rate Calculation Sheet) will automatically plot and display the graphic representation of rate of change of temperature over time and the corresponding calculated SAR values. This allows the user to repeat the same experiment for N number of times with very minimal effort, interpret and compare the results automatically with mARCS.



For more information or to request a quotation please visit
www.nanotherics.com.