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Tomografisk bestemmelse af kernetemperaturer

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Udfordringen

Bestem temperaturen af det koldeste punkt i kødproduktet

Nøjagtighed: 0.5°C ??

Fokuspunkter

Temperaturfordeling

Inline 100% (alt.: sampling)

Berøringsfri

Inspirationskilder

Medico

Plastindustrien

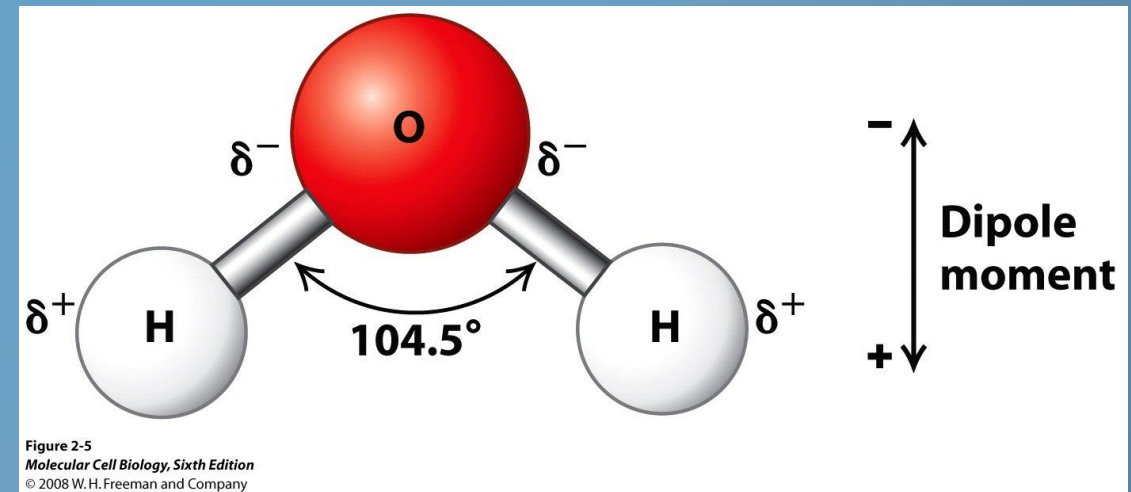
Flyindustrien



Projektet er en del af Resultatkontrakten

4 kandidater

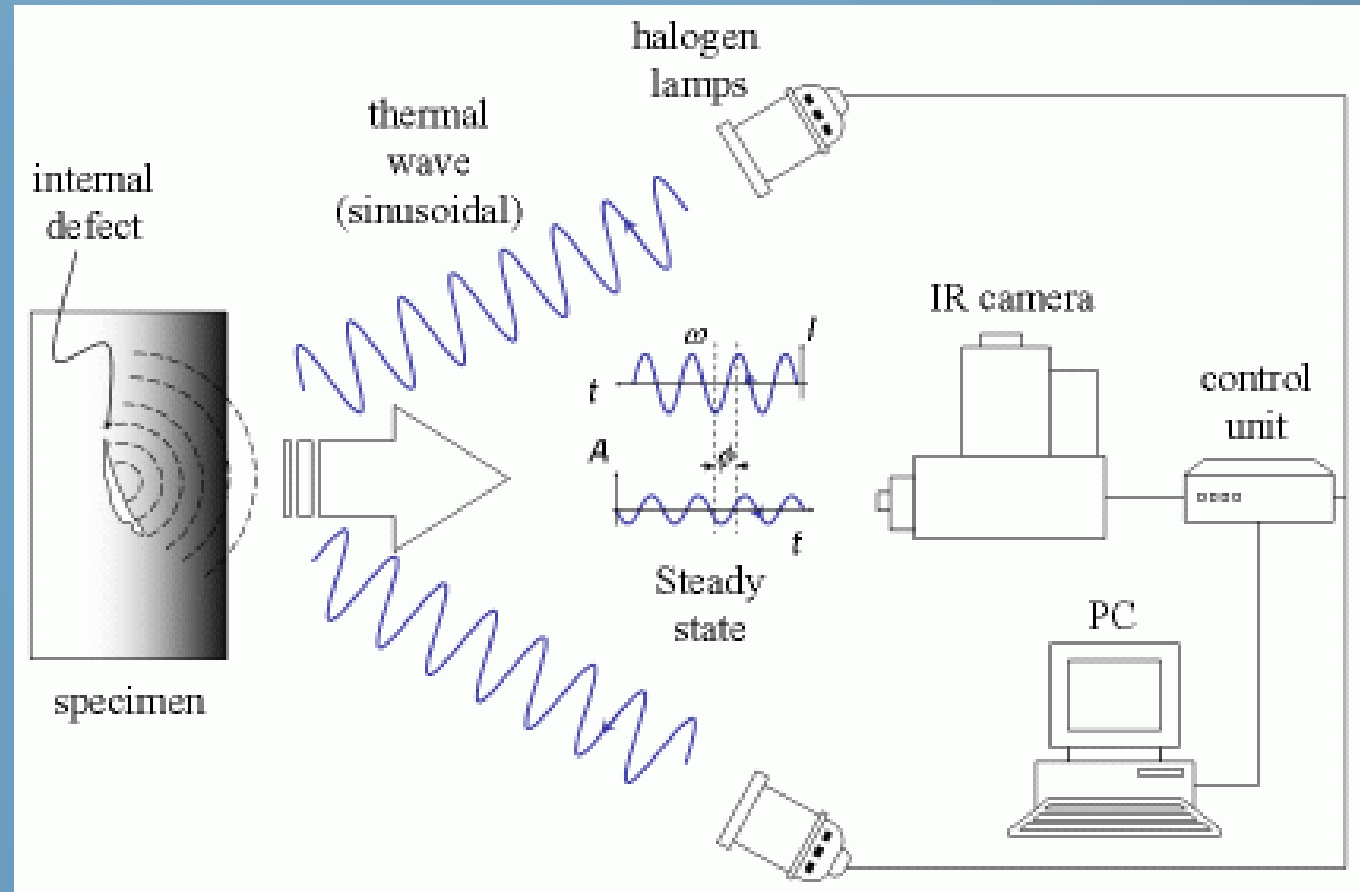
- Puls termografi
- Ultralyd
- Mikrobølger
- NMR/MRI



Puls termografi

Anvendes til:

- De-laminering
- indre kaviteter

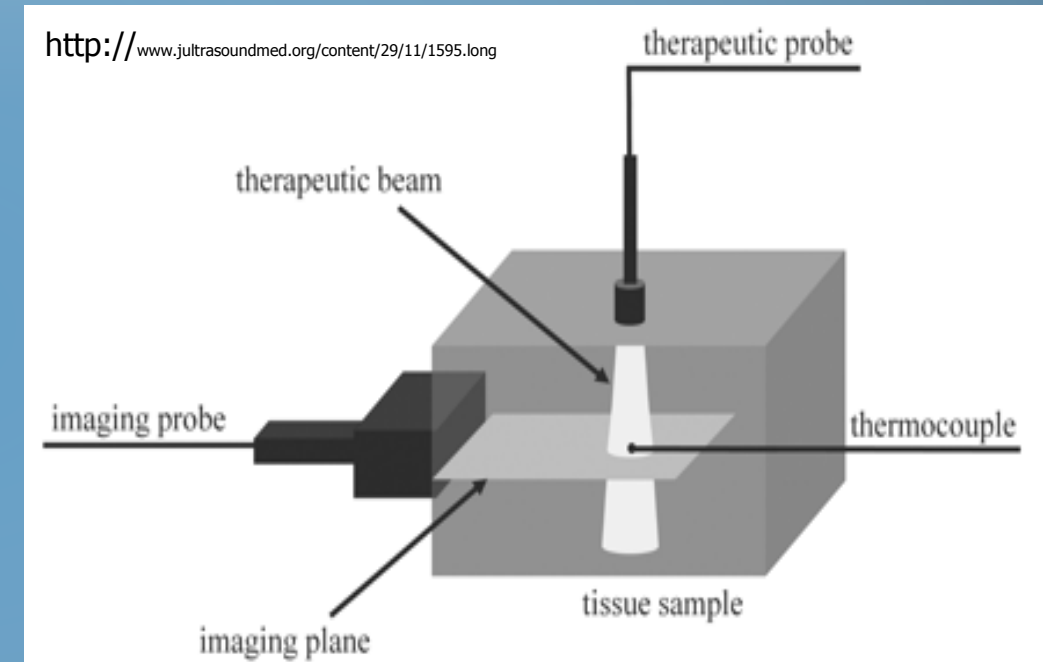
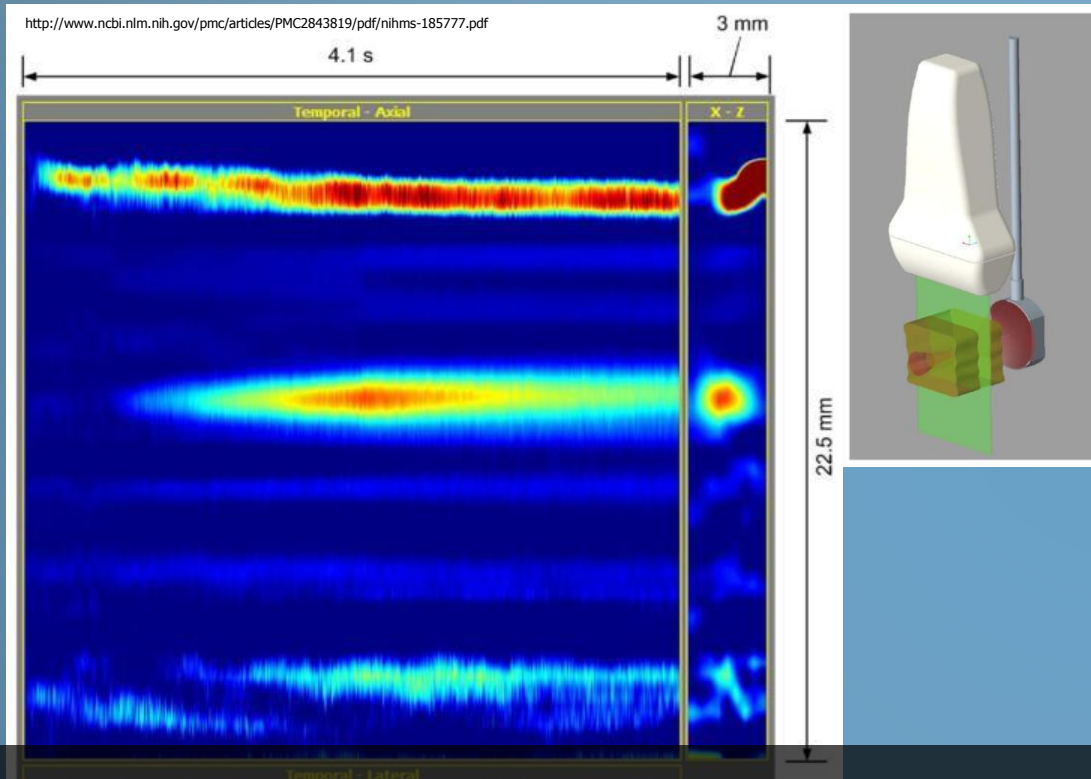


Defektstørrelse $> 1.4 \times$ dybden

Ultralyd



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However, for temperature elevations much higher than 50°C , the major limitation of this temperature estimation technique comes from the irreversible changes in the acoustic properties of tissue due to necrosis. In the case of coagulative necrosis, the acoustical properties of the tissue are completely altered in the heated region with corresponding changes in the backscattered signals.

http://www.boulder.nist.gov/div853/Publication%20files/NIST_IEEE_uffc_waters_2004.pdf



390 Improving the thermal processing of food

Microwave temperature (°C)

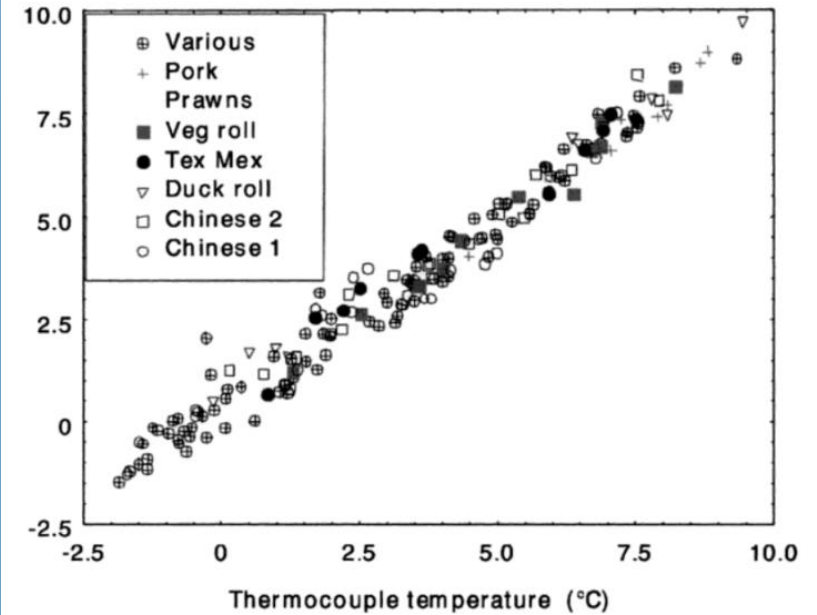
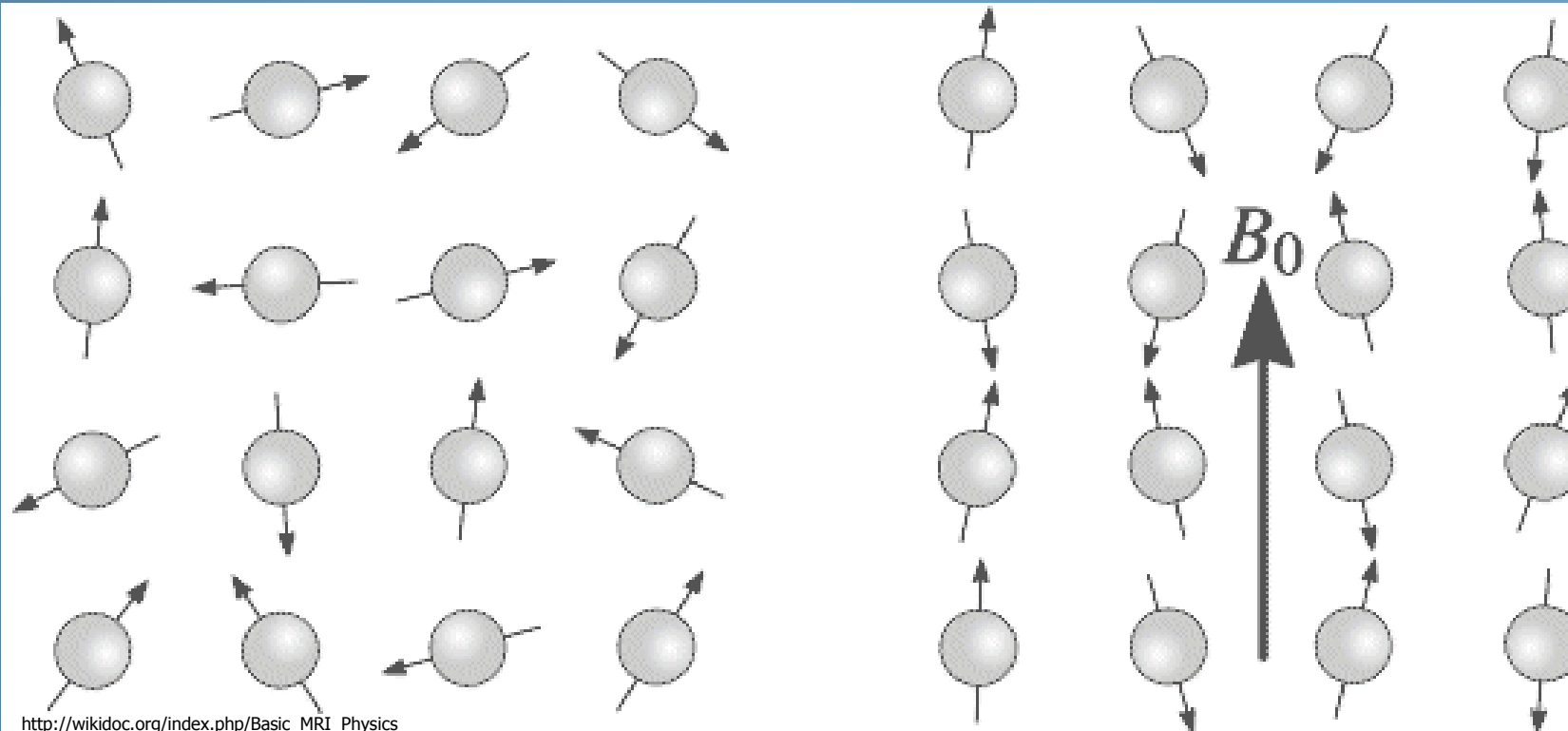


Fig. 19.1 Graph of a 'weighted average' temperature measurement by microwave radiometry vs. point measurements using thermocouples (courtesy of Dr D.V. Land, University of Glasgow, UK).

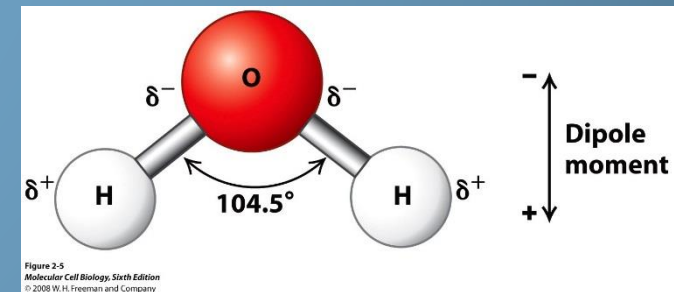
Mikrobølge måling af temperatur med LOMA Celsius®

NMR / MRI



http://wikidoc.org/index.php/Basic_MRI_Physics

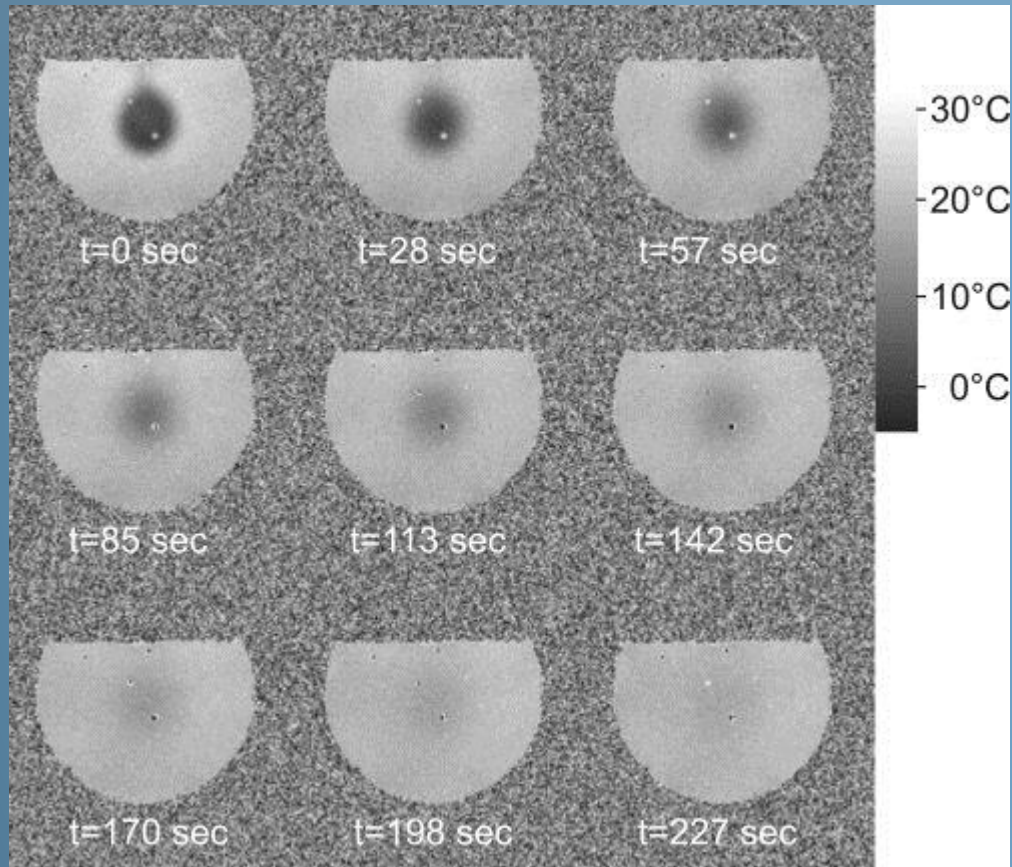
$$\omega = \gamma * \mathbf{B}$$
$$\gamma_{\text{H}} = 42.58 \text{ MHz/T}$$



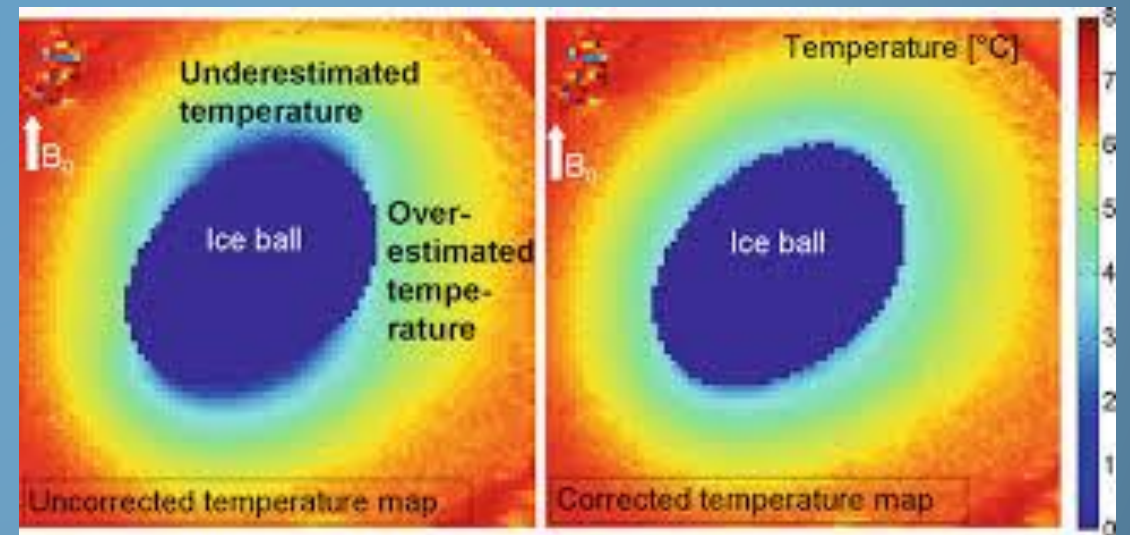
Udligning af cold spot målt med MR i gel fantom



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Cryo-ablation i grisekød



Magnetic Resonance in Medicine

Volume 51, Issue 6, pages 1205-1211, 24 MAY 2004 DOI: 10.1002/mrm.20081

<http://onlinelibrary.wiley.com/doi/10.1002/mrm.20081/full#fig7>

Diskussionsoplæg

Berøringsfri kernetemperatur



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Hvilke kvalitetsforbedringer kan I opnå?
Hvor kan I høste de største besparelser?
Hvad siger myndighederne?

Findes egnede teknikkandidater?
Et interessant teknologiområde?
Deltagelse i et F&U-projekt?