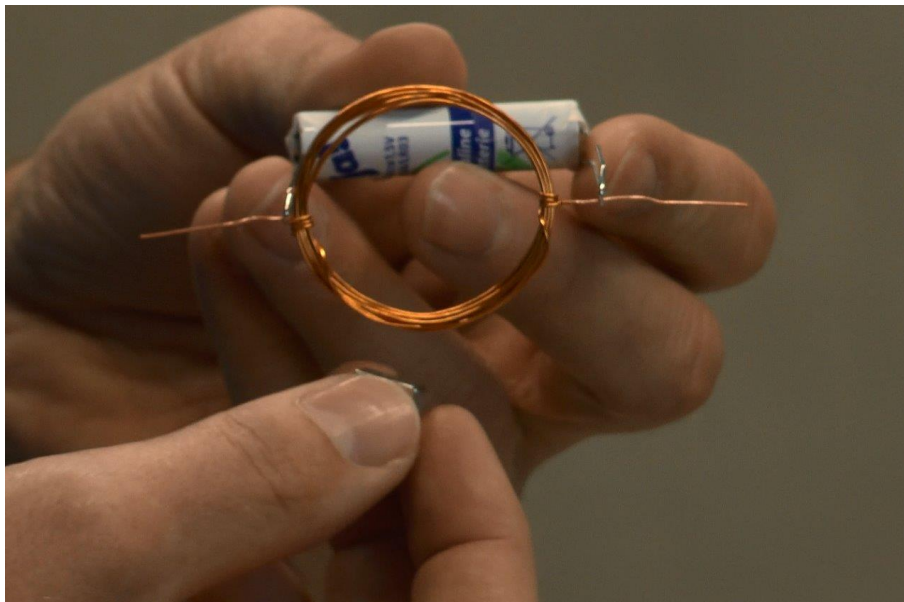

Future Materials



Fachgebiet Funktionale Materialien, Prof. O. Gutfleisch

Example Solution

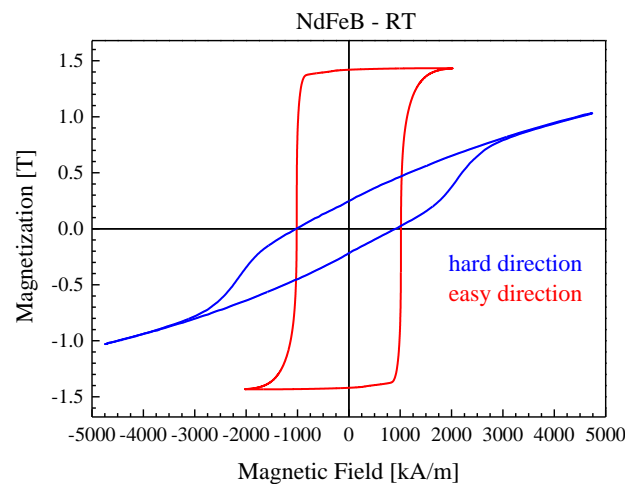
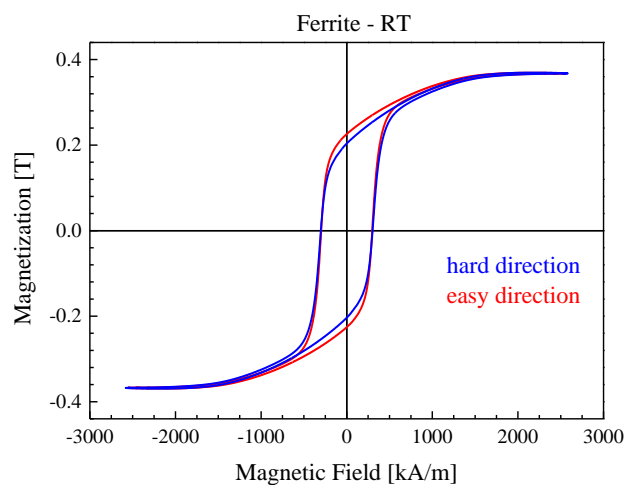
Task 1



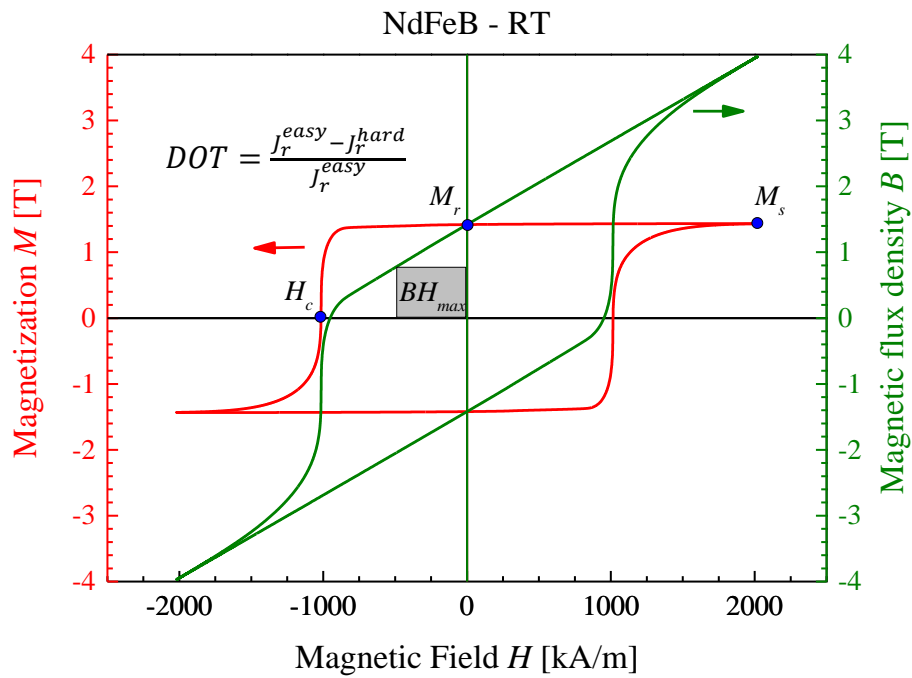
Task 2

- Ferrite not textured → easy and hard direction nearly coincide
- NdFeB is highly textured → very large Anisotropy in easy and hard direction

Material	M_s [T]	M_r [T]	H_c [kA/m]	DOT [%]	BH_{max} [kJ/m ³]
Ferrite	0,36	0,23	299,1	9,73	8,7
NdFeB	1,43	1,42	1019,2	87,03	385,9



The Ferrite magnet is useful for low cost low performance applications when the size and weight is not important, for instance a black board magnet. NdFeB is much more expensive but is also much stronger. Therefore you can reduce the size and weight of your motor significantly because much less material is needed. This is because the energy density BH_{max} is about 50 times larger in NdFeB.



With increasing working temperature the performance of NdFeB reduces drastically. This is a very important issue for the usage in electric vehicles where the motor temperature easily can rise to 180 °C. The load line drawn in demonstrates that the magnet which was measured can be used for instance for a motor in this specific shape. But at higher temperatures this geometry can no longer be used because of demagnetizing effects.

