

UK Magnetics Society

57 The Philog, Cardiff, CF14 1DZ, Wales, United Kingdom
T: +44 (0) 2920 626643 E: astewart@ukmagsoc.co.uk W: www.ukmagsoc.org

Magnetic Materials for the 21st Century

Two day seminar • 22nd & 23rd October 2012 • Vacuumschmelze GmbH & Co KG, Hanau, Germany

Applications of Nanocrystalline Inductive Components - Now and Tomorrow

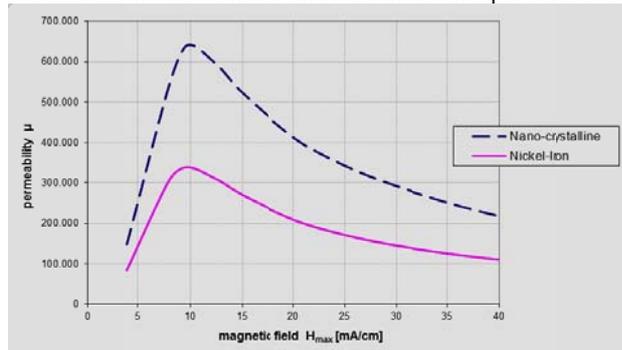
Dr Martin Ferch, Magnetec GmbH

Due to the unique combination of excellent soft magnetic properties, nano crystalline materials will become increasingly important and will help to further improve tomorrows advanced power electronic systems. Applications like energy generation, energy distribution, energy measurement and finally energy management will become more efficient, more reliable, lighter, smaller and smarter at the same time compared to existing designs with conventional soft magnetic materials.

Thus, nano crystalline inductive components will play an even more important role in the establishment of the world wide Smart Grid project which is supposed to be the backbone of the 'new electricity age'.

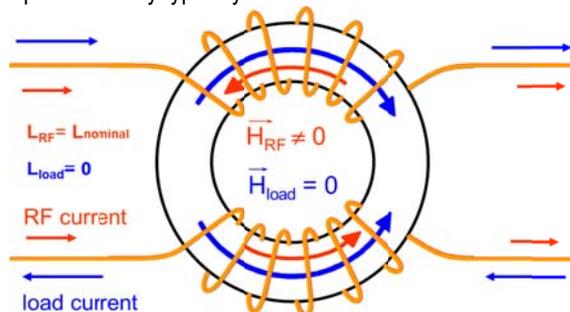
Application example 1: ELCB / RCCB / RCD

Years ago, ELCB were equipped with Permalloy (NiFe) cores. In the recent years those cores were more and more replaced by nanocrystalline versions. Due to about double the permeability this resulted in much smaller and meanwhile cheaper solutions.



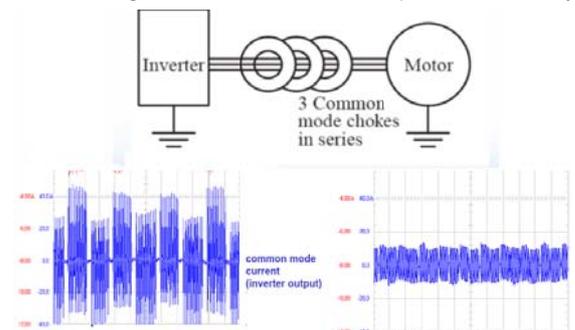
Application example 2: common mode EMC Filter chokes

For many years common mode filter choke were solely equipped with Ferrite cores. Due to their significantly higher permeability nano crystalline core materials reduce weight, size and power loss by typically at least 50%.



Application example 3: EMC and bearing current protection

High power applications in the Megawatt range like wind turbines or big inverter drives face generator or motor bearing currents which reduce the lifetime significantly. Big nano cores operated as single-turn inductors solve the problem efficiently.

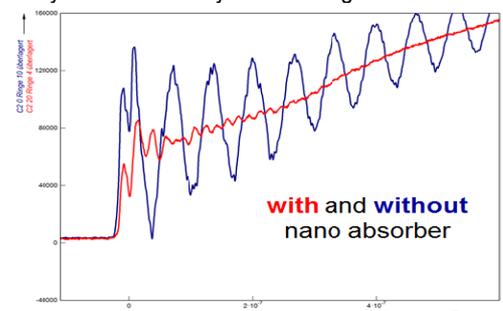


Application example 4: UHV DC power transmission lines

UHV DC power lines feature only 5% of the transport losses compared 50Hz AC HV lines which is the most important feature for long distance lines. Nano cores provide the protection of the IGBTs in the HV cascades operating at 800kV up to 1,2 MV.

Application example 5: HV gas insulated switchgear (GIS)

In combination with UHV DC lines (example 4) nano cores attenuate destructive high current RF transient pulses in GIS which destroy the insulation system of the grid elements.



Application example 5: smart metering (watt hour meters)

Watt hour meters for household and industrial applications are mostly equipped with a current transformer for each phase. Nano crystalline cores offer a unique linearity in a large range of temperature and magnetisation at a moderate price level.

Several more publications concerning nano crystalline components and their applications can be found here: <http://www.magnetec.de/en/download-archive/>