



COST 526
“Automatic Process Optimization in Materials Technology”
(APOMAT)

Half-Yearly Report

To be sent to **V.Tesch@access.rwth-aachen.de** until **August 31, 2002**

1. Reporting Period	1.1.2002 – 30.6.2002
Project title	Optimization of heat treatment of magnetic materials applying the thermomagnetic curves data
Project leader Organization	Dr. Tomáš Žák Institute of Physics of Materials, AS CR, Žižkova 22, CZ-61662 Brno
Main collaborators involved	Faculty of Natural Sciences and Engineering, University of Ljubljana

2. Funding Situation

Amount of money received specifically for COST
Other resources partially used for the project

0 kEuros
0 kEuros

3. International Collaboration

(mention group and type of work done in collaboration during the reporting period)

Participation in the Working Group Meeting in Saint-Dié des Vosges + project progress report

- YES
 NO

D.M. Minić, Faculty of Physical Chemistry, University of Belgrade, Yugoslavia
Collaboration on an FeW material, thermomagnetic curves measurement

4. Industry participation

(mention name of companies and work done in collaboration during the whole project)

No

5. Meetings, visits, exchange of scientists, short-term scientific missions	Location, date



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6. Progress within the reporting period

(Not exceeding 3 pages, including tables and figures)

As in the period in scope no decision was delivered to the project leader about the funding situation and thus no money was available for the COST project, only some basic and preliminary work could be done.

It was collected and measured some fundamental amount of samples having more or less typical shape of their thermomagnetic curves to make some basic consideration about the modelling.

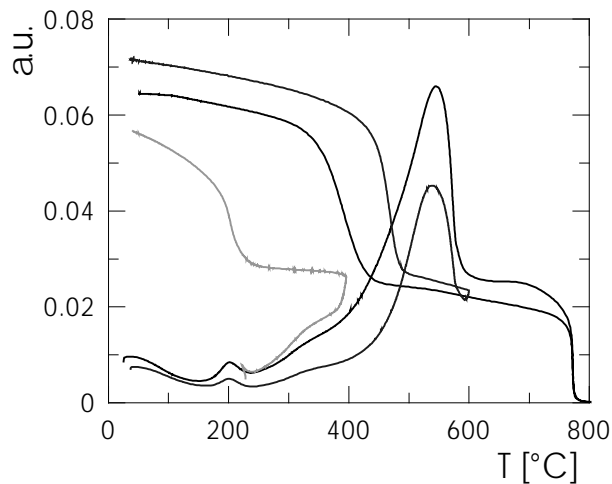


Fig. 1. Iron oxides with metallic iron

In the Fig. 1 you can see family of curves of a material containing a mixture of iron oxides with metallic iron taken under various conditions. The final stay of the material after the thermomagnetic curve measurement differs from the original one by a large amount of ferromagnetically ordered atoms.

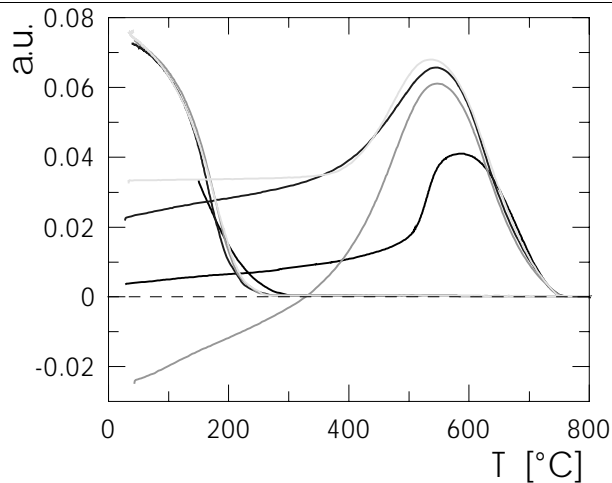


Fig. 2. Nitrated austenitic steel

Rather simple are the curves in the Fig. 2 measured on the nitrated austenitic stainless steel. It is obvious that the thermal process changes the structure due to austenitization with a subsequent formation of a ferromagnetic, probably ferritic phase under 200 °C.

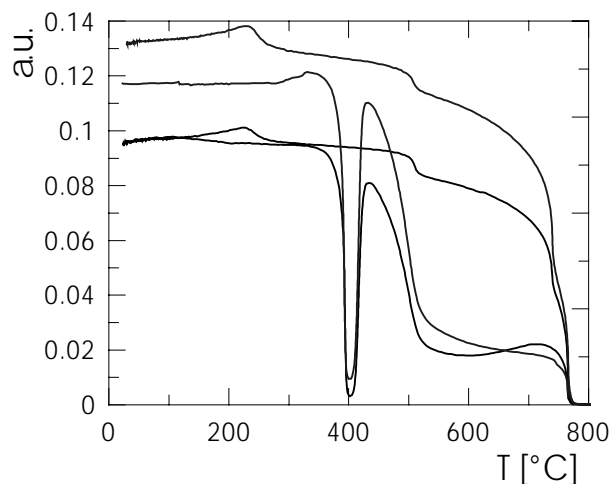


Fig. 3. Amorphous alloy

These curves were measured on a sample with an amorphous structure which is during the heat treatment changed into a microcrystalline one. After a further temperature raise the fine crystalline structure becomes coarse and the excellent properties starts to degrade. Curie temperatures of an amorphous base, crystalline products, and pure iron can be nicely distinguished.

Here presented examples and other curves will be parameterized now to enable their simulation and simulation of processes being behind them.

The author wishes to express thanks to his colleagues Y. Jirásková and B. David for the supplying of measured data and M. Vondráček for his help with measurements.

7. List of publications

a) Published

Y. Jirásková, M.Svoboda, O. Schneeweiss, T. Žák: **Structural properties of austenitic stainless steel in the initial state and after rf plasma nitriding**, Czechoslovak Journal of Physics, **52**(2002), A61.

b) Submitted for publications

M. Vondráček, T. Žák: **Bundle of hysteresis loops at temperature sweep measured by vibrating sample magnetometer**

Submitted to the Journal of Electrical Engineering

c) In preparation

D.M. Minić, T. Žák, O. Schneeweiss, M. Ristić: **The Synthesis and Properties of Amorphous Fe-W Powder**