

MAGNETOCALORIC EFFECT IN METALS: THEORETICAL DESCRIPTION AND PERSPECTIVES*

N. A. de Oliveira^(a), P. J. von Ranke^(a), A. Troper^(b)

^(a) Universidade do Estado do Rio de Janeiro, Rua São Francisco Xavier 524 3º andar,
Rio de Janeiro, 20550-013, Brazil

Tel: #55-21 2334 0379, Fax #55-21 2334 0379, nilson@uerj.br

^(b) Centro Brasileiro de Pesquisas Físicas, Rua Xavier Sigaud 150 Urca,
Rio de Janeiro, 22290-180, Brazil

ABSTRACT

Over the last years, the magnetocaloric effect has been experimentally (Gschneidner Jr et al) and theoretically (de Oliveira et al) studied in a series of metallic compounds. Despite the achievements obtained so far many points still need to be discussed. From the theoretical point of view, a good model should not only fit the experimental data of the magnetocaloric potentials but also correctly describe the physical mechanisms involved in the effect. In this work, we present an overview of the theoretical descriptions of the magnetocaloric effect in metallic systems, considering the origin of their magnetism. The focus of this work will be in transition metal compounds and their alloys. We made our discussion through a model Hamiltonian in the framework of the band theory, including the two body Coulomb interaction, the energy of electrons hopping, the coupling with the external magnetic field and the applied pressure effect. We made a systematic discussion in terms of the model parameters and present some important results obtained for real compounds with second and first order transition. We also present some new perspectives in the calculations of the magnetocaloric properties in this type of compounds.

*This work is financially supported by CNPq and FAPERJ.

REFERENCES

- Gschneidner Jr K A, Pecharsky V K, Tsokol A O, Rep. Prog. Phys. 2005, 68 1479-1539.
de Oliveira N A, von Ranke P J, Physics Reports 2010 489, 89-159.

Corresponding author	First name: Nilson	Last name : de Oliveira
	E-mail address: nilson@uerj.br	
Topic	Materials, theory and numerics	