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EDITORIAL

Technologically used magnetic materials are mostly ferromagnetic (including also ferrimagnetic types). The classical applications of these materials may be grouped into "hard" and "soft" materials, the first ones being "sources" of the magnetic field, the second ones are field "conductors". They are characterized by the highest possible and lowest possible coercive field, respectively. Besides these classical ones, several other types of magnetic materials have been developed for which properties other than coercive force or permeability are essential, such as for instance particular shapes of the hysteresis loop for magnetic switching and data storage, high frequency properties, magnetostrictive and magnetooptical properties, including even magnetic liquids. Magnetic materials may be either metallic or non-metallic, they may be crystalline or amorphous and they may be used as bulk materials or thin layers.

Magnetic properties are strongly anisotropic. In fact, magnetic anisotropies belong to the strongest ones among all physical properties. Magnetic anisotropies may be due to several reasons. They may be of "crystallographic" nature, i.e. due to crystal structure or to directional ordering. Anisotropy may also arise from particle shape or arrangement, and also internal stresses may be sources of anisotropy. The crystallographic anisotropies are of basic importance, since they are somehow involved in virtually all kinds of anisotropies and they are usually present even if no other type of anisotropy contributes to the materials properties.

The crystallographic anisotropies are referred to crystal directions. Technological materials are usually polycrystalline and they may or may not have preferred orientations—i.e. textures—of their grains. Magnetic properties of materials are thus often very closely related to the crystallographic texture of the material. In most of all technological applications of magnetic materials one or several directions are favoured with respect to other ones (e.g. two mutually perpendicular directions in transformer core sheets). Hence, in most cases the "application profile" is anisotropic and it is best "served" by a material having a similar anisotropic "property profile". This is the reason why texture control has always been a prominent task in the production of magnetic materials. This comprises texture measurement, or at least texture inspection, by various methods e.g. optical methods, X-ray, neutron or electron diffraction or physical anisotropy measurements.

A second point—and certainly the more important one—is the question how to produce the required texture in a material. This implies the investigation of texture development by solid state processes of any kind such as primary crystallization from a non-crystalline state, plastic deformation, all kinds of recrystallization processes—primary, secondary or continuous grain growth, phase transformations as well as rigid rotation of particles under external influences e.g. a magnetic field. Finally, the production of the material with the appropriate texture has to be continuously inspected and controlled, which leads to the development of on-line texture analyzers.

Notwithstanding the basic importance of the texture for all kinds of magnetic properties, there are also several other "generalized textural quantities" which have to be taken into account in order to understand the properties of magnetic materials. These are, for instance, orientation correlations between neighbouring crystallites, domain size, shape, and arrangement, as well as particle size, shape, and arrangement.

It was the purpose of the symposium "Texture Control and Anisotropy of Properties in Magnetic Materials" held at the World Materials Congress in Chicago in September 1988 to deal with texture and all other textural quantities and their influence on anisotropic magnetic properties of all kinds of materials. Fundamental research on texture formation was equally considered as technological property control and inspection. The papers presented at the symposium are collected here. Hence, the present proceedings provide a good survey on activities and the state of the art in the production of anisotropic magnetic materials.

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