LOCAL VARIATIONS OF UNIAXIAL ANISOTROPY IN THIN FILMS

ЛОКАЛЬНЫЕ ВАРИАЦИИ ОДНООСНОЙ АНИЗОТРОПИИ В ТОНКИХ СЛОЯХ

The anisotropy of thin ferromagnetic films has hitherto been measured as the mean value of the whole film, either indirectly from the hysteresis loops [1] or directly by the torsion method [2] or the method of ferromagnetic resonance [3]. The latter method can be used to measure the local variations of anisotropy in different places of the same sample [4]. Such measurements were carried out on permalloy films vacuum deposited under different conditions.

The samples were vacuum deposited from a tungsten wire from a melt containing 78% Ni and 22% Fe, at a distance of 10 cm, on an unheated glass slide 15 mm in diameter. The thicknesses of the deposited films, measured by the method of multiple interference, were in the limits 200 ÷ 2000 Å. Small circular regions of the film were investigated by ferromagnetic resonance; the film was pressed to an opening 0·5 mm in diameter in the wall of a resonance cavity of mode H_{111}. The film could be shifted and rotated so that the resonance field could be determined in any point (or small region) and any direction. The spectrometer used for spin-electron resonance functioned in the 3 cm wave-length region, the resonance fields were measured by means of a nuclear magnetometer. For the sake of comparison the mean value of the anisotropy was determined with a torsion magnetometer having a resolving power of 5×10^{-4} dyne cm. Ferromagnetic resonance was also used to determine the saturation magnetization of the film.

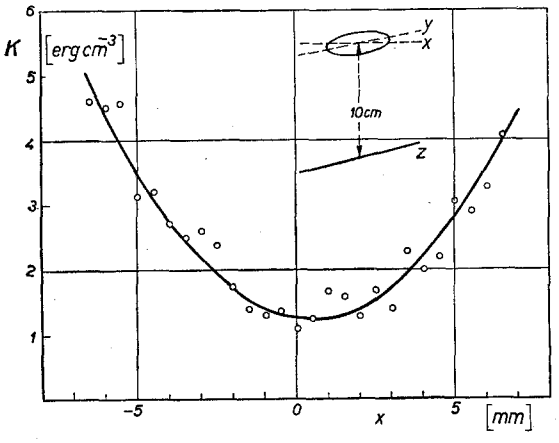

Fig. 1. Dependence of constant of uniaxial anisotropy K on distance x from centre of film. Accuracy in determining K is $\pm 0{\cdot}5$ erg cm^{-3}, accuracy in adjusting x is $\pm 0{\cdot}15$ mm.

The results of a typical measurement are shown in Fig. 1, where the values of the local anisotropy of the film are plotted as a function of the distance from the centre of the film in the direction of the x axis indicated in the figure. The film was vacuum deposited in a magnetic field having an intensity around 300 Oe applied in the y direction normal to x, from a line source z parallel to the field and located perpendicularly under the film. The film was 1000 Å thick and was covered with a protective layer of MgF_2. Direct measurement by the torsion method established that the anisotropy constant was $2{\cdot}0 \times 10^3$ erg cm^{-3}, the arithmetic mean of the local values of this constant measured in 17 points distributed over the whole surface of the film was $2{\cdot}1 \times 10^3$ erg cm^{-3}. The direction of easy magnetization in all points agreed with the y axis.

The increase in anisotropy towards the edge of the film according to Fig. 1 agrees qualitatively with the results of D. O. Smith and other authors [5]: the anisotropy produced as a result of oblique depositing, which has the same sense as the magneto-induced anisotropy and grows with the angle of depositing, is added to the magneto-induced anisotropy.

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UNIT CELL AND SPACE GROUP OF $H_3Na_3KCu(IO_6)_2 \cdot 14H_2O$

ЭЛЕМЕНТАРНАЯ ЯЧЕЙКА И ПРОСТРАНСТВЕННАЯ ГРУППА $H_3Na_3KCu(IO_6)_2 \cdot 14H_2O$

A number of compounds was prepared by Jenšovský in which a trivalent behaviour of copper was found by chemical tests. Some of these compounds were obtained in a form of large single crystals on crystallization. The crystallographic study of these compounds has not yet been undertaken.

The unit-cell data of $H_3Na_3K\,Cu\,(IO_6)_2 \cdot 14\,H_2O$ were obtained from rotation and Weissenberg photographs taken with Cu K radiation about the principal axes. The space group was determined from the statistics of nearly all reflections accessible to measurement with Cu K radiation by taking a number of supplementary equi-inclination Weissenberg photographs.

The obtained data can be summarized as follows:

System	Space Group	a(Å)	b(Å) $\pm$ 0,02	c(Å)	γ $\pm$ 04′	Density g . cm^{-3} obs.	calc.	Z
Monoclinic	P 2_1/b	6.12	14.84	25.18	97°38′	2.58	2.56	4

The detailed crystal structure analysis of this substance is now in progress.

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ВЛИЯНИЕ ДАВЛЕНИЯ НА СПЕКТР ПОГЛОЩЕНИЯ ХЛОРИСТОГО НАТРИЯ, ОКРАШЕННОГО ПРИ ПОМОЩИ ЭЛЕКТРОЛИЗА

THE INFLUENCE OF PRESSURE ON THE ABSORPTION SPECTRUM OF ELECTROLYTICALLY COLOURED NATRIUM CHLORIDE

Кияма и Окомото [1] окрашивали кристаллы NaCl электролизом, нагревали до 400°C, и поддерживали при этой температуре. Таким способом получили в них коллоиды. При пластической деформации наблюдали образование полосы F и M за счет коллиодной полосы. Гачкаилом [2] обнаружены две полосы в ультрафиолетовой области абсорбционного спектра кристалла NaCl, окрашенного электролизом. На основе этих работ [3] можно ожидать, что пластическая деформация имеет влияние на эти полосы в электролитически окрашенных кристаллах.

Кристаллы NaCl выращивали по методу Киропоулоса. Образцами служили столбики размером 1 × 1 × 2 cm. Окрашивание произведенно электролизом при температуре 700°C. Кристалл зажимался между двумя стержнями. Один из стержней был сильно

[1]) Этот эксперимент был сделан в физическом Институте Карлова Университета в Праге. Приношу благодарность проф. Л. Заховалу, который дал мне возможность для выполнения этой работы. Искренне благодарю ассистента К. Вацека за внимание и помощь и лаборантов Яну Гаусерову и И. Лацика за приготовление рисунков.