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## CONCERNING THE SUPERCONDUCTIVITY OF $V_3In$

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A recent communication reports observation of superconductivity in the compound $V_3In$ [1]. The critical temperature of this compound, as indicated by the authors, was 13.9°K. It is also reported there that the authors were able to synthesize, besides $V_3In$, a number of other vanadium compounds having the $Cr_3Si$ lattice, namely $V_3Cd$, $V_3Pb$, $V_3Tl$, and $V_3Bi$. The last four compounds exhibited no superconductivity at $T > 4.2°K$.

As indicated in [1], the samples of all the compounds were prepared by diffusion annealing vanadium wire in the vapor of the corresponding metal in a sealed quartz-glass ampoule, at a temperature 1000 - 1200°C, for twenty hours.

A few years ago we attempted to synthesize $V_3In$ and $V_3Al$ and to investigated the superconducting properties of these compounds. The samples were prepared in the following manner: Powders of the initial metals were mixed in the required ratios and pressed with a hydraulic press into cylinders of 5 mm diameter and 8 - 10 mm length. The samples were suspended on a vanadium wire or foil in a quartz-glass ampoule, which was evacuated, sealed, and placed in the loop of a high-frequency oven to sinter the samples.

The so-prepared samples of V with In and V with Al became superconducting at critical temperatures ~10°K and ~15°K, respectively.

Further investigations have revealed that if the walls of the quartz ampoule are covered on the inside with a vanadium foil, then the critical temperature of the samples is greatly lowered, to 2°K in some cases. The samples underwent a spectral analysis, which showed that the spectra of all the samples that became superconducting at high temperatures contained rather intense silicon lines, whereas in samples so prepared that they became superconducting at temperatures below 4.2°K, no silicon was observed.

Introduction of small amounts of powdered quartz glass into the sample caused superconductivity to set in at high temperatures (~10°K) even when the ampoule walls were covered with vanadium foil.

The foregoing facts give grounds for assuming that sintering of samples of vanadium-containing systems in quartz ampoules may be accompanied by de-oxidation of the ampoule walls by the metal vapor and the formation of the ternary compounds $V_3Si_xM_{1-x}$ on the surface of the sample, and these cause lines of the $Cr_3Si$ lattice to appear in the x-ray spectrum. Our measurement of the critical temperatures in the ternary system V-Si-In and the x-ray data on V-Al system favor this assumption.

It is quite probable that the superconductivity of the V samples subjected to diffusion annealing in In vapor in [1] is also the consequence of the formation of the ternary compound $V_3Si_xIn_{1-x}$ and is not connected with the superconductivity of the compound $V_3In$, the existence of which is still doubtful.

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## ANOMALIES OF THE MAGNETOSTRICTION OF SAMARIUM AND THULIUM IRON GARNETS AT LOW TEMPERATURES

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We have already reported on the unusual magnetostriction properties of iron-garnets and gallium-garnets of the rare earths terbium, dysprosium, holmium, and erbium at low temperatures [1,2]. A characteristic feature of these garnets is their tremendous magnetostriction near 4.2°K, which has been attributed to the anisotropy of the electron cloud of the ions $Tb^{3+}$, $Dy^{3+}$, $Ho^{3+}$, and $Er^{3+}$ and its interaction with the intracrystalline field of the lattice.

We report here an anomalous behavior of the magnetostriction, which we observed at low temperatures in samarium and thulium iron garnets. The measurements were made on polycrystalline samples of $Sm_xY_{3-x}Fe_5O_{12}$ (x = 0, 0.5, 1, 2, 3) and $Tu_3Fe_5O_{12}$ by a capacitance method [3] in the temperature interval 4.2 - 100°K and in magnetic fields up to 25 kOe.

Figure 1 shows the temperature dependences of the magnetostriction (λ) and the saturation magnetization ($\sigma_s$) of iron garnets of the Y-Sm system. We see that whereas the $\sigma_s$(T) curves for different compositions differ very little from one another, the magnetostriction curves have a very complicated character and depend significantly on the $Sm^{3+}$ concentration in the garnet,

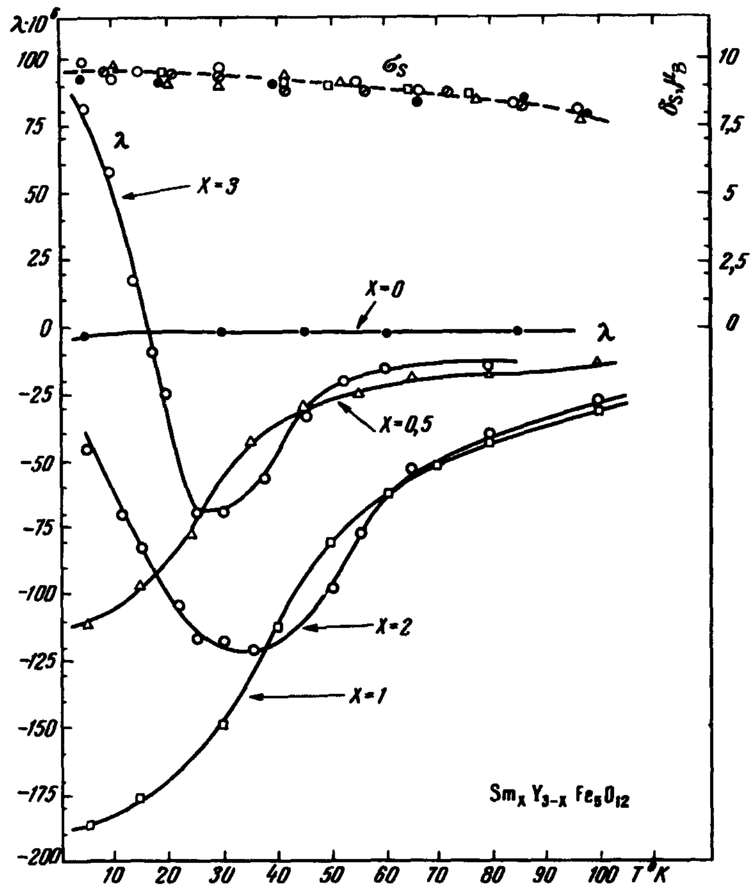


Fig. 1. Magnetostriction (λ) and saturation magnetization ($\sigma_s$) of Y-Sm garnets vs. temperature.