

# Composition Dependence of the Long-Period Layer Stacking Sequence in the Structure of the Ternary Alloy $Mg_3In_{1-x}Cd_x$ (Physics)

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is qualitatively explained by the local contraction in the  $c$  plane.

### **X-Ray Photoemission Study of the Liquid Au-Sn Alloy**

T. ICHIKAWA

Phys. Status Solidi a, **32** (1975), 369.

X-ray photoemission spectra of the core and valence states of liquid and solid Au-Sn alloys have been measured. The composition dependence of binding energies of the Au  $4f_{5/2, 7/2}$  peaks suggests that the liquid Sn-rich alloy has a fairly fixed type of local atomic environment around Au atoms different from that in the solid Sn-rich alloy. Estimated composition indicates that the surface is enriched in Sn component on an average.

### **Constitution of the Magnesium-Indium System near the Composition of $Mg_3In$ and Phase Transition of $\beta_1$ Phase**

Yousuke WATANABE

Acta Metall., **23** (1975), 691.

The phase diagram of the Mg-In system was re-examined, as there was some uncertainty as to the phase transition of  $\beta_1$  phase in the literature. It was found that the direct transition of  $\beta_1$  to  $\beta'$  phase is prevented by the two phase region in the whole composition range investigated. In addition to this, location of  $Mg_5In_2$  phase ( $\beta_3$  phase) in the diagram was for the first time made clear.  $\beta_3$  phase is stable only below 210°C and decomposes into  $\beta'$  and  $\beta_2$  phases above this temperature. The confirmation of the crystal structure of  $\beta_1$  phase was also done on single crystal electron diffraction patterns.  $Mg_3In$  changes its structure from ordered 12R to disordered f.c.c. through ordered 3R with increasing temperature. The transformation energy associated with the change in the stacking sequence (12R  $\rightarrow$  3R) and that associated with the order-disorder phase change were estimated by specific heat measurements to be  $\sim 120$  cal/mole and  $\sim 340$  cal/mole, respectively.

### **Composition Dependence of the Long-Period Layer Stacking Sequence in the Structure of the Ternary Alloy $Mg_3In_{1-x}Cd_x$**

Yousuke WATANABE

J. Phys. Soc. Japan, **38** (1975), 141.

The effect of the replacement of some fraction of the indium atoms with cadmium atoms on the structural stability of the long-period layer stacking sequence in  $Mg_3In$  has been studied by means of X-ray and electron diffraction experiments. The observed changes in electron diffraction patterns can be described by Kakinoki's equation and suggests that when the cadmium content is

increased the stacking sequence changes from  $(3\bar{1})_3$  to  $(1\bar{1})$ , passing through  $(3\bar{1}\bar{1})_3$ , with increasing amount of stacking disorder, while the atomic arrangement in the close-packed plane remains unchanged irrespective of the composition. Structural changes observed in the present investigation have been found similar to the pressure effects in  $\text{Mg}_3\text{In}$  previously reported. The stability of the long-period layer stacking structure is briefly discussed by application of the pseudo-potential theory.

### **Zeeman Effect of an Induced Absorption Line in Highly Excited CuCl**

Takuchi ANZAI, Takenari GOTO and Masayasu UETA

J. Phys. Soc. Japan, **38** (1975), 774.

Zeeman effect is studied for a narrow absorption line at 390.89 nm in CuCl crystal induced by a nitrogen laser excitation, the appearance of which was reported previously as a possible evidence for the Bose condensation of excitons. From the Zeeman splitting, it is concluded that this absorption corresponds to the formation of an exciton bound to a transiently generated neutral donor.

### **Near-Edge Spontaneous Photoluminescence in $\text{GaSe}_{1-x}\text{S}_x$**

K. KURODA and Y. NISHINA

Phys. Status Solidi b, **72** (1975), 81.

Photoluminescence spectra of  $\text{GaSe}_{1-x}\text{S}_x$  ( $0 \leq x \leq 0.2$ ) are investigated at 4.2 K by the time resolving method. The shift in the photon energies of the luminescence lines with respect to the chemical composition  $x$  may be understood without any quantitative contradiction if one employs the empirical model that the direct conduction band edge lies 5 meV below the indirect one, whereas the ground state of the direct exciton lies 13 meV above that of the indirect one in  $\epsilon$ ,  $\gamma$ -GaSe at 4.2 K. The direct-indirect gap reversal occurs near  $x=1 \times 10^{-2}$ .

### **Matsushita Carbon Resistors as Thermometers for Use at Low Temperatures and in High Fields**

Sinhachiro SAITO and Takashi SATO

Rev. Sci. Instrum., **46** (1975), 1226.

A survey has been made of the properties of 1/8W composite resistors made by the Matsushita Electric Ind. Co. Ltd. to determine whether they might be suitable as secondary thermometers in the low-temperature region. From the measurements of resistance vs temperature, between 105°C and 40 mK, it is confirmed that the grade ERC-18SGJ resistors in various nominal room-temperature resistance values from 20 to 510  $\Omega$  are suitable in very low-temperature work, and that resistors in the nominal resistance range 20–100  $\Omega$  are the most suitable for work down to several