Abstracts of Forthcoming Articles

Electrical Transport Properties of Zn Doped ZnO. K. I. HAGEMARK, L. C. CHACKA. 3M Central Research Laboratories, P.O. Box 33221, St. Paul, Minnesota 55133. Electrical resistivity and Hall effect measurements at 77–373 K are presented for Zn doped ZnO crystals. The crystals have been doped systematically at 600–1100°C in controlled pressures of Zn. The concentration of electrons at room temperature is in the range $n_{RT} = 2.5 \times 10^{16}$ to 3.6×10^{18} cm^{-3}. The donor level E_D and the concentrations of donors N_D and acceptors N_A have been calculated from a best fit to the experimental relationships $\log n$ versus $1/T$ and $\log \mu_H$ versus $\log T$. At dilute concentrations of donor two donor levels have been observed, $E_D^I = 0.043$–0.045 eV and a deeper level E_D^{II} greater than 0.165 eV. The ZnO was found to behave as a metal at $N_D \sim 6 \times 10^{18}$ cm^{-3}. At least two different donors have to be assumed in order to explain the experimental results. It is suggested that interstitial Zn is the electrical active donor at higher doping levels. The nature of the other donor is not clear. Neither "1s^1" H-type nor "1s^2" He-type donors seem to consistently explain all the observations.

Study of the Ternary System Fe–Cr–Te Around the Composition FeCr$_2$Te$_4$. A. BEGOUEN-DEMEAUX, G. VILLERS, P. GIBART. Laboratoire de Magnetisme, C.N.R.S., 1, Place Aristide Briand, 92190 Meudon-Bellevue, France. The system Fe–Cr–Te was investigated around the composition FeCr$_2$Te$_4$. FeCr$_2$Te$_4$ is a metastable compound. Single crystals with Fe$_{0.93}$Cr$_{1.76}$Te$_4$ composition were grown by vapor transport or Bridgman method. These crystals are metallic and anisotropic ferromagnets.

Perovskite-like La$_{1-x}$K$_x$MnO$_3$ and Related Compounds: Solid State Chemistry and the Catalysis of the Reduction of NO by CO and H$_2$. R. J. H. VOORHOEVE, J. P. REMEIKA, L. E. TRIMBLE, A. S. COOPER, F. J. DiSALVO, AND P. K. GALLAGHER. Bell Laboratories, Murray Hill, New Jersey 07974. The new compounds La$_{1-x}$M$_x$MnO$_3$ ($0.05 \leqslant x \leqslant 0.4$ for $M = K$; $x = 0.2$ for $M = Na$, Rb) have been prepared. La$_{1-x}$K$_x$MnO$_3$ ($0.05 \leqslant x \leqslant 0.4$), LaMnO$_{3.01}$, LaMnO$_{3.15}$, La$_{0.8}Na_{0.2}MnO_3$ and La$_{0.8}$Rb$_{0.2}$MnO$_3$ have been used as catalysts in the reduction of NO. La$_{0.8}$K$_{0.2}$MnO$_3$ has also been used in the catalytic decomposition of NO. The activity of these catalysts is related to the presence of a Mn^{3+}/Mn^{4+} mixed valence and to the relative ease of forming oxygen vacancies in the solid. The presence of cation vacancies in LaMnO$_{3.15}$ and the substitution of La^{3+} by alkali ions in LaMnO$_3$ increases the catalytic activity. The reduction of NO involves both molecular and dissociative adsorption of NO.

Evidence for the Initiation of Copper Azide [Cu(N$_3$)$_2$] and Thallium Azide [TlN$_3$] by Carrier Emission from Schottky Barrier Contacts. PETER MARK AND THADDEUS GORA. Department of Electrical Engineering, Princeton University, Princeton, New Jersey 08540. It has been reported that the initiation field ε_t for Cu(N$_3$)$_2$ (p-type material) increases with anode metal work function while ε_t for TlN$_3$ (n-type material) decreases with cathode metal work function. It is shown that this behavior is consistent with carrier emission from a Schottky barrier contact.

Electronic and Magnetic Properties of LaNi$_{1-x}$Co$_x$O$_3$, LaCo$_{1-x}$Fe$_x$O$_3$ and LaNi$_{1-x}$Fe$_x$O$_3$. C. N. R. RAO, O. PRAKASH, AND P. GANGULY. Department of Chemistry, Indian Institute of Technology, Kanpur 208016, India. LaNi$_{1-x}$Co$_x$O$_3$ shows itinerant d-electron behavior similar to LaNiO$_3$ up to $x = 0.5$. In the range $0.5 < x < 1.0$ the cobalt spin state equilibrium is markedly affected; the localized-itinerant electron transition of LaCoO$_3$ is not seen when $x < 0.95$. In LaCo$_{1-x}$Fe$_x$O$_3$, itinerancy of d-electrons decreases with increase in x and the compositions with $x > 0.5$ are similar to LaFeO$_3$. If $x > 0.1$ the localized-itinerant electron transition is not seen and the cobalt spin state equilibrium is considerably altered. In LaNi$_{1-x}$Fe$_x$O$_3$, itinerancy decreases with increase in x. These observations can be satisfactorily explained in terms of Goodenough's energy band schemes.

Statistical Approach to Anderson–Grüneisen Parameters δ. S. GUPTA, M. N. SHARMA, AND S. R. TRIPATHI. Department of Physics, Lucknow University, Lucknow-226007, India. A simple and general relation has been developed for the Anderson–Grüneisen parameter δ in terms of the Grüneisen parameter γ, employing a statistical approach for ionic crystals. The relation can be expressed as:

$$\delta = a\gamma^b$$

where a and b are some arbitrary constants. It has been concluded that the developed relation is a general form of Chang's relation ($\delta = 2\gamma$).