

Abstracts of Papers by Bell System Authors Published in Other Journals

CHEMISTRY

The Electrical Conductivity of Fluid Selenium Up to Supercritical Temperatures and Pressures. H. Hoshino*, R. W. Schmutzler¹, W. W. Warren, and F. Hensel, *Phil. Mag.*, 33, No. 2 (1976), pp. 255-259. The electrical conductivity of fluid selenium has been measured as a function of temperature and pressure to 1750°C and 1200 bars, respectively. The conductivity isobars exhibit strong increases to nearly metallic behavior in selenium above 1300°C at supercritical pressures. Above 1500-1600°C the conductivity isobars drop sharply toward more insulating behavior. *Hokkaido University, Japan; ¹ Philipps Universität, Germany.

Excited State Bromine Atom and Molecule Reactions. K. B. McAfee, Jr., R. M. Lum, and R. S. Hozack *J. Chem. Phys.* 64, No. 12 (June 15, 1976), pp. 5073-5076. Using a novel capillary optical reactor to shorten drastically free radical chain lengths, we have separately identified and followed substitution and photo-addition reactions of excited $^2P_{1/2}$ and ground state $^2P_{3/2}$ bromine atoms with propylene. Evidence for reactions of electronically excited bromine molecules ($B^3\Pi_{ou}^+$) has also been obtained.

Non-bonded vs. Bonded Interactions in $(Ph_3P)_4Ag_2Br_2-(Ph_3P)_4Ag_4Br_4$ and its Stereochemical Analogue $[(RS)_4Fe_2S_2]^{2-}-[(RS)_4Fe_4S_4]^{2-}$. Boon-Keng Teo and Joseph C. Calabrese*, *J. C. S. Chem. Comm.* (1976), pp. 185-186. The stereochemistry of the metal-metal nonbonded dimer-tetramer pair $(Ph_3P)_4Ag_2Br_2-(Ph_3P)_4Ag_4Br_4$ exhibits trends resembling those of the structurally analogous metal-metal bonded pair $[(RS)_4Fe_2S_2]^{2-}-[(RS)_4Fe_4S_4]^{2-}$, indicating that the metal atoms within each pair probably bear similar gross atomic charges.

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ELECTRONIC AND ELECTRICAL ENGINEERING

Continuous Room-Temperature Operation of $GaAs-Al_xGa_{1-x}As$ Double-Heterostructure Lasers Prepared By Molecular-Beam Epitaxy. A. Y. Cho, R. W. Dixon, H. C. Casey, Jr., and R. L. Hartman, *Appl. Phys. Lett.*, 28, No. 9 (May 1, 1976), pp. 501-503. The continuous (cw) operation at temperatures as high as 100°C of stripe-geometry $GaAs-Al_xGa_{1-x}As$ double-heterostructure lasers fabricated by molecular-beam epitaxial (MBE) techniques has been achieved. Improved MBE laser performance was the result of the extensive efforts to eliminate hydrocarbon and water vapor from the growth apparatus. For 12- μm -wide stripe-geometry lasers with 380- μm -long cavities, the cw threshold currents varied between 163 and 297 mA at room temperature.

$GaAs$ MESFET Prepared by Molecular Beam Epitaxy (MBE). A. Y. Cho and D. R. Ch'en*, *Appl. Phys. Lett.*, 28, No. 1 (January 1, 1976), pp. 30-31. $GaAs$ metal-semiconductor field-effect transistors (MESFET) have been prepared by molecular-beam epitaxy. At 6 GHz a noise figure of 3 dB was obtained with a corresponding gain of 10 dB. The transconductance of the device was 28 mmhos and F_{max} was approximately 35 GHz.

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On Solving the Transient, Conducting Slab With Radiating and Convecting Surfaces. J. L. Milton and W. P. Goss*, *Trans. ASME, J. Heat Transf.*, 97 (November 1975), pp. 630-631. Physical reasoning has been employed to develop stability criteria for explicit finite-difference solutions to transient conducting slabs with (nonlinear) radiating and convecting surfaces. The "derivative method" of stability analysis requires $\partial T^{new}/\partial T^{old} \geq 0$. The "explicit method" requires that the positive (real) root of the governing quartic polynomial be determined. Favorable comparison of the methods is reported.

MATERIALS SCIENCE

Effect of Hydrogen on Amorphous Silicon. J. J. Hauser, *Solid State Commun.*, 19 (1976), pp. 1049-1051. Amorphous Si films prepared by dc sputtering in hydrogen—argon mixtures possess a high resistivity ($\approx 10^{10} \Omega\text{-cm}$) similar to that of films prepared by the glow discharge decomposition of silane.

PHYSICS

Distribution Coefficient of P for Growth of $\text{Ga}_{1-x}\text{Al}_x\text{As}_{1-y}\text{P}_y$ by LPE Determined Using Auger Spectroscopy. C. C. Chang, M. B. Panish, W. R. Wagner, D. L. Rode, S. Sumski and R. G. Sobers, *J. Appl. Phys.*, 47 (1976), pp. 3752-3753. Auger spectroscopy was combined with ion milling for quantitative chemical analysis and depth profiling to measure the effective distribution coefficient of phosphorus, k_p , during growth of $\text{Ga}_{1-x}\text{Al}_x\text{As}_{1-y}\text{P}_y$ by liquid phase epitaxy. Below $y = 0.02$ (with $x = 0.36$), and with cooling rate of $0.1^\circ\text{C}/\text{min}$ for growth, k_p was 290 at growth temperature of 790°C and constant down to at least $y = 0.002$. This high value of k_p caused depletion of P from the growth solution.

Implications of Radiative Equilibrium in Neoclassical Theory. F. R. Nash and J. P. Gordon, *Phys. Rev. A, Gen. Phys.*, 12, No. 6 (December 1975), pp. 2472-2486. It is found that the description of spontaneous emission provided by the neoclassical extension of semiclassical electrodynamics, which has been given by Jaynes and his collaborators, is inconsistent with the well-secured laws of Boltzmann and Planck for conditions of thermal equilibrium.

Nd:YAG Single-Crystal Fiber Laser: Room-Temperature CW Operation Using a Single LED as an End Pump. J. Stone, C. A. Burrus, A. G. Dentai, and B. I. Miller, *Appl. Phys. Lett.*, 29, No. 1 (July 1, 1976), pp. 37-39. CW laser action has been obtained using as-grown single-crystal Nd:YAG fibers end-pumped by a single high-radiance LED. The fibers were 0.5 cm long and $80 \mu\text{m}$ in diameter, and the diameter of the LED luminous area was $85 \mu\text{m}$. The lowest cw laser threshold was observed at a diode drive current of 45 mA.