Bandgaps of Compound Semiconductor Alloys

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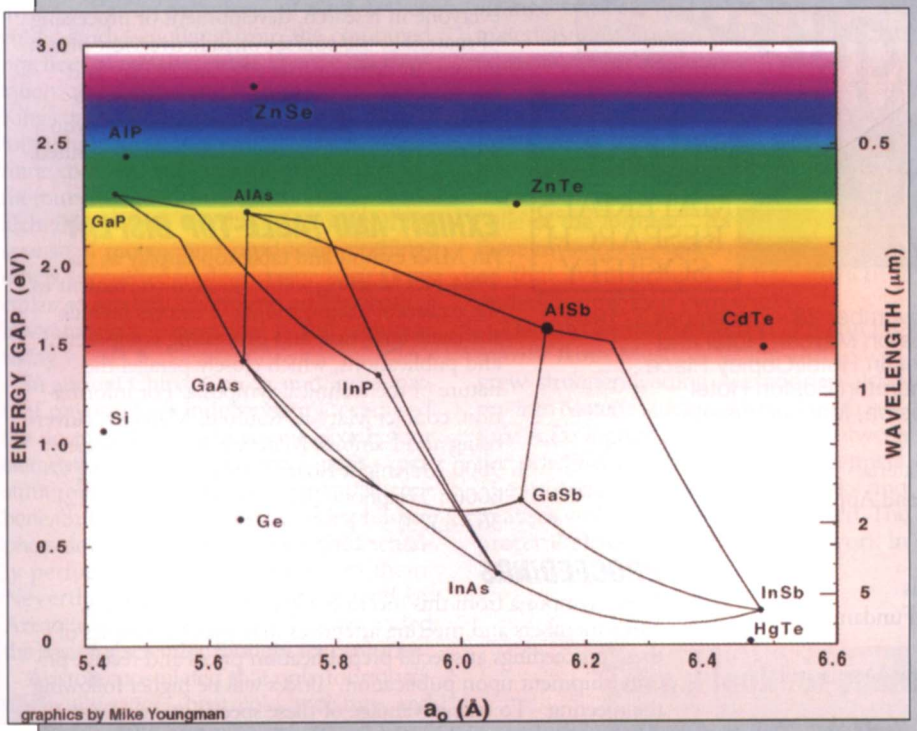

The family tree of III-V and II-VI compound semiconductors has a wide range of lattice constants and a correspondingly broad spectrum of bandgap energies. The horizontal rainbow depicts visible transitions available in materials with large energy gaps (trending to small lattice constants) while tie lines indicate the properties of pseudobinary compounds formed from the end point compounds. Discontinuous slopes in these tie lines correspond to band crossovers from indirect to direct. Some tie lines are straight, usually indicating ignorance of "bowing parameters." Graphics by K. Rice and M. Youngman, Sandia National Laboratories. (Previously unpublished.)

SEMICONDUCTOR PROPERTIES

	Lattice Constant a_o(Å)	Energy Gap E_g(eV)	Mobility @ 300K (cm^2/V sec)	
			Electrons	Holes
Si	5.4310	1.11	1400	470
Ge	5.6461	0.67	3900	1900
GaP	5.4506	2.26	110	75
AlP	5.4625	2.45		
GaAs	5.6535	1.42	8500	400
AlAs	5.6605	2.17	280	
InP	5.8688	1.35	5000	150
InAs	6.0584	0.36	33000	460
GaSb	6.0954	0.72	5000	850
AlSb	6.1355	1.58	900	450
InSb	6.4788	0.17	80000	1250
ZnSe	5.6676	2.80	530	
ZnTe	6.0880	2.20	530	130
CdTe	6.4816	1.49	700	60

The MRS Bulletin's Facts and Figures department presents graphs, nomographs, tables, charts, and frequently used information of the type compiled by materials researchers and often taped to the walls by their desks. These "cheat sheets" are intended to be not only interesting but useful enough to keep for reference. Please send your comments and any potential material for future publication to: Alan Hurd (ajhurd@sandia.gov), Sandia National Laboratories, Albuquerque, NM 87185-0609.

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November 28 - December 2, 1994
Boston Marriott Hotel and
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Boston, Massachusetts

TECHNICAL PROGRAM

A: Beam-Solid Interactions for Materials Synthesis and Characterization
B1: Evolution of Thin-Film and Surface Structure and Morphology
B2: Thin Films - Stresses and Mechanical Properties V
C: Structure and Properties of Interfaces in Ceramics
D: Atomic Level Control of Epitaxial Heterostructures
E: Chemical Perspectives of Microelectronics Materials IV
F: Microcrystalline & Nanocrystalline Semiconductors
G: Science and Technology of Fullerene Materials
H: High Tc Superconductivity - Materials and Applications
I1: Materials for Smart Systems
I2: Ferroelectric Thin Films IV
Ja: Engineering of Nanostructured Materials
Jb: Grain Size and Mechanical Properties - Fundamentals and Applications
K: Chemical Vapor Deposition of Refractory Metals and Ceramics III
L: High Temperature Ordered Intermetallic Alloys - VI
M: Ceramic Matrix Composites - Advanced High-Temperature Structural Materials
N: Dynamics in Small Confining Systems II
Oa: Computational Approaches and Applications to Predicting Properties of Complex Materials
Ob: Applications of Innovative Knowledge Bases in Materials Design
P: Fractal Aspects of Materials
Q: Characterization and Properties of Defects in Polymer Materials
R: Polymer Matrix Composites
S: Biomolecular and Biomimetic Materials
T: Synthesis and Properties of Advanced Catalytic Materials
U: Solid State Ionics IV
Va: Microstructure of Cement-Based Systems
Vb: Bonding and Interfaces in Cementitious Materials
W1: Advances in Porous Materials
W2: Hollow and Solid Spheres and Microspheres - Science and Technology Associated With Their Fabrication and Application
X: Frontiers of Materials Research
Y: Microstructure of Irradiated Materials
Za: Optical Waveguide Materials
Zb: Materials for Optical Limiting
AA: Applications of Synchrotron Radiation Techniques to Materials Science II
BB: Neutron Scattering in Materials Science II

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