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strips this fast-growing field of much of that shroud of mystery. The author clearly and thoroughly explains the underlying materials principles behind this exciting technology.

MBE as a subdiscipline has been around long enough to have generated a handful of texts that go beyond the straightforward conference proceedings, which typically cover only the latest developments for experts within the field. M. A. Herman and H. Sitter's *Molecular Beam Epitaxy: Fundamentals and Current Status* (Springer-Verlag, New York, 1989) and E. Kasper and J. C. Bean's *Silicon Molecular Beam Epitaxy* (CRC P., Boca Raton, Fla., 1988) both present unified overviews of the field from the perspectives of its finest practitioners, and E. H. C. Parker's *The Technology and Physics of Molecular Beam Epitaxy* (Plenum, New York, 1985) treats in great detail the actual MBE hardware that is so integral to the field. But Tsao manages to cut through the MBE technology issues most readers find so daunting and instead concentrates on the real materials science underpinnings of the growth technique. In so doing, he addresses a much wider audience than those hundreds of MBE crystal growers. Not only does the reader get a rare and insightful view into the MBE growth process, but he or she is treated to a remarkably complete course in the underlying disciplines of thermodynamics and kinetics, with careful explanations of when and where to apply each approach.

Thermodynamics pervades the majority of the topics discussed, and the book includes a good exposition of the essentials required for the in-depth treatments that follow. These include phase stability as it applies to vapor deposition, the concepts of congruent and incongruent evaporation, a thermodynamic treatment of surface roughening and a particularly detailed exposition of the cluster variation method, which is useful in treating pseudobinary III-V alloys.

Another theme running throughout the book is that of coherency and the effect of strain. Tsao gives an exceedingly thorough treatment of valence-force field calculations and how they can be applied to strain, and his treatment of critical thickness and dislocations in strained-layer epitaxy brings the classic ideas of Matthews and Blakesley several leaps ahead into the 1990s. His transformation of the classic deformation diagram concept of Harold Frost and Mike Ashby into a tool for predicting the kinetics of strain relaxation is a gem.

This text is not for casual bedtime reading. The author does a wonderful job, however, of summarizing the underlying physical underpinnings of each topic treated before embarking on his often exhaustive and complete mathematical treatments, thus allowing the reader to explore each area in the depth he or she desires. A complete set of references and a comprehensive set of problems at the end of each chapter make it an ideal text for an undergraduate or graduate course. It will be on my bookshelf for years to come.

JAMES P. HARBISON
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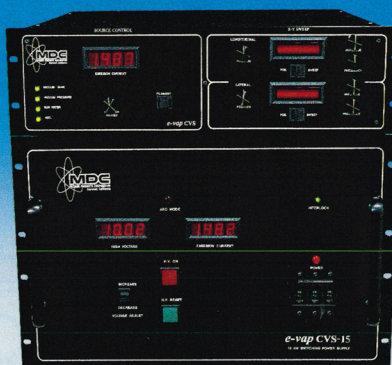
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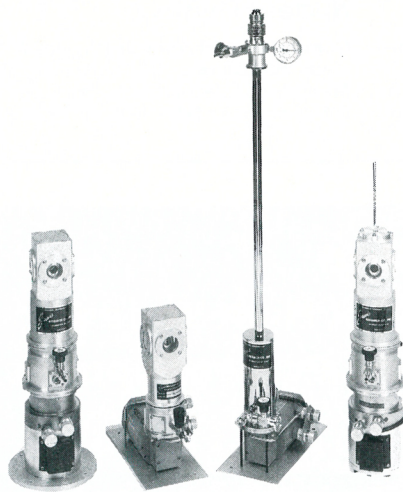


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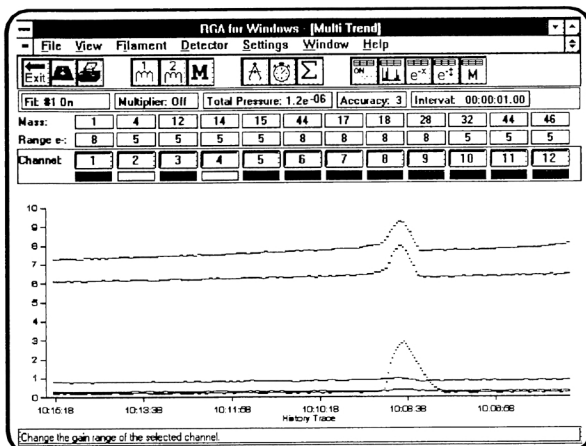
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