

**SESSION C4: GeSi: FROM MATERIALS RESEARCH TO DEVICES AND TECHNOLOGY. SYMPOSIUM  
OF THE COMMITTEE ON APPLICATIONS OF PHYSICS**

**Monday afternoon, 21 March 1994; Room South 2 at 14:30: L. Rubin, presiding**

**14:30**

**C4 1 An Overview of GeSi Materials: Structural Stability, Band Offsets, and Electronic Structure.**

**S. Froyen\* National Renewable Energy Laboratory.**

This paper reviews the properties of GeSi materials. The main focus will be on electronic properties of alloys and short period superlattices as a function of composition, substrate composition, and substrate orientation. Band-gap bowing<sup>1</sup> and band offsets<sup>2</sup> will be discussed. Brillouin zone folding, which in short period superlattices can lead to quasidirect band-gaps and greatly enhanced optical transitions, will be described. Finally, structural stability of alloys and superlattices will be addressed.

<sup>1</sup> J. F. Morar and P. E. Batson, *J. Vac. Sci. Technol. B* **10**, 2022 (1992).

<sup>2</sup> E. T. Yu et al., *J. Vac. Sci. Technol. B* 8,908 (1990); W.-X. Ni and G. V. Hansson, *Phys. Rev. B* 42, 3030 (1990).

<sup>3</sup> T. P. Pearsall et al., *Phys. Rev. Lett.*, 58,729 (1987); S. Froyen, D. M. Wood, and A. Zunger, *Phys. Rev. B* 36,4547 (1987); *Phys. Rev. Lett.* 62, 975 (1989); *Appl. Phys. Lett.* 54, 2435 (1989); *Thin Solid Films* 183, 33 (1989); M. S. Hybertson, and M. Schliiter, *Phys. Rev. B* **36**, 9683 (1987); S. Satpathy, R. M. Martin, and C. G. Van de Walle, *Phys. Rev. B* 38, 13237 (1988); U. Menzinger et al., *Phys. Rev. B* 47,4099 (1993) and references therein.

<sup>4</sup> A. Ourmazd and J. C. Bean, *Phys. Rev. Lett.*, 55, 765 (1985); J. E. Bernard and A. Zunger, *Phys. Rev. B* 44, 1663, (1991); E. Miiller et al., *Phil. Mag. Lett.* 64, 183 (1991); J. E. Jesson et al., *Phys. Rev. Lett.*, 70, 2293 (1993); E. K. et al., *Phys. Rev. B* 10012(1993)

\*Presented by Alex Zunger