SEARCH FOR CONDITIONS OF CO-EXISTENCE OF TAMM AND SHOCKLEY STATES IN SUPERLATTICE WITH PERTURBED SURFACE

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9.7 cm

This study is based on the surface states classification proposed by Zak[1], and the analysis is performed using the transfer matrix method as formulated by James[2]. Conditions for existence of electron surface states are studied in a semi-infinite superlattice with alloy concentration changing either abruptly (square potential), or gradually (sinusoidal potential). A small surface perturbation is introduced into this model by modifying the shape of a potential well near the surface. The effect of this surface perturbation on Shockley states is studied, in order to find the threshold perturbation which *destroys* the existing surface state, shifting it from the gap to a band. For Tamm states, we search for a minimum perturbation inducing surface states *to appear*. The results obtained do show co-existence of Tamm and Shockley states within the specific range of the variable model parameters.

[1] J. Zak, Physical Review **B32**, 2218 (1985).
[2] H.M. James, Physical Review **76**, 1602 (1949).

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