As discussed in detail in the preceding chapters, the field effect in gases and in vacuum can be used only as a semiquantitative method in comparisons of directions of changes in such quantities as Y_0, $Q_{ss}(Y)$, and $s(Y)$ caused by various perturbations. Attempts to deduce accurate values of the parameters N_t, E_t, c_p, and c_n from measurements of the field effect meet with serious difficulties, associated with the inhomogeneity of the surface, which may be intrinsic or induced by the field effect. We are thus faced with two problems: 1) preparation of a uniform surface; 2) development of measurement methods which do not disturb the uniformity of the surface.

In the light of these problems, it seems imperative to study in greater detail the dependences of $s(Y)$ and $Q_{ss}(Y)$ on the crystallographic orientation of the surface, as begun in [20], and to search for new measurement methods. In principle, the second task is already solved: one can use the field effect in MOS structures and in electrolyte-semiconductor systems (see, for example, [129]). In both cases, the inhomogeneity associated with the variable air gap in the usual field effect is eliminated. However, an MOS structure is not convenient for the solution of the problem outlined above since surface conditions can be changed only with great difficulty, if at all.

The electrolyte-semiconductor system is more promising in this respect. It is surprising to find that this system is not very popular compared with the usual gas-semiconductor system, although the use of an electrolyte has the following advantages: 1) a high degree of surface homogeneity or at least complete elimination of the inhomogeneity of the induced charge; 2) omnidirectional field effect; 3) the possibility of the experimental determination of $\mu_s(Y)$ by comparison of the $C(Y)$ and $\delta G(Y)$ curves.

Moreover, the electrolyte-semiconductor system retains many advantages of the field effect in gases: it provides opportunities for changing the surface structure, oxidizing it, carrying out adsorption experiments, etc.

Magnetic fields, used in the same way as in the electric-field effect, may be found useful in such studies because they can be employed to alter the carrier density in the surface layer [130-132]. The advantage of magnetic fields would lie in measurements of the "magnetic field effect" on a free surface, which are very desirable in studies of adsorption and absolutely essential in investigations of clean surfaces.

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