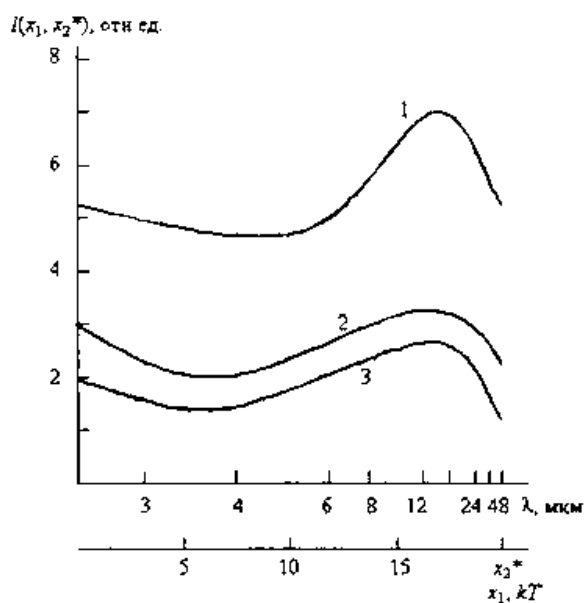


# LASER PHOTOEXCITATION AND PHOTODISSOCIATION OF MOLECULES: OPTIMIZED SCHEMES FOR CLEANSING SEMICONDUCTOR MATERIALS FROM ADMIXTURES

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Selective photo-ionization and photo-dissociation of molecules method is supposed to be very much perspective method for cleaning materials from molecular admixtures and other applications [1-5]. For example, the laser cleaning mono-silan is of a great interest for obtaining a poor Si in the semiconductor industry. The key problem is carrying out the optimal schemes of laser photo-ionization and dissociation processes for molecules. Here we present a new multi-level optimized model for definition of the optimal form of laser pulse to reach the maximal effectiveness of laser action in process of laser photoionization (dissociation) of molecules. Model is based on differential equation of the Focker-Plank type for density of molecules with the vibration energy  $x$  on a chosen vibration level and operators, describing the RT relaxation and action of external radiation [2]. As example, the conditions and parameters for optimal excitation for molecules of  $\text{HCl}$ ,  $\text{PH}_3$ ,  $\text{CF}_3\text{Br}$ ,  $\text{SiH}_4$  are found. In fig. we present the dependence (of number of particles) of the functional:  $I(u) = \int_{x_1, t_1}^{x_2, t_2} h(x) dx$  in the energy interval  $x \in [15, 21]$  (in units of  $kT$ ) on  $x_1$  and laser wavelength, corresponding to rotational transition  $X_1-X_2$  ( $T=300$  K). Here  $h(x)$  is the function, corresponding to required form of the final distribution  $f(x, t, u)$ , i.e. density of molecules with vibration energy  $x$  at moment  $t \in [0, R]$ .



An important moment of calculation is connected with account for the real form of laser pulse [2]. Testing of model is carried out also for molecule  $\text{PH}_3$  under laser UV radiation action on molecules of  $\text{SiH}_4$ .

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