

Ultrasonic Treatment Effects on $\text{CuS}_{1.8}$ – CdSe Structures

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Ultrasound (US) is established to affect properties of II-VI semiconductors [1, 2]. However to the best of our knowledge, there have not reports on US influence on II-VI–based solar cells, whereas similar effects are detected in other barrier structures [3]. Our work has focused on the modification by US treatment (UST) of electrical properties of $\text{CuS}_{1.8}$ – CdSe thin film photodetector. The longitudinal waves (8.4MHz) were used for UST. The current-voltage characteristics were measured over a temperature range 290-340 K both before and after UST.

The analysis has been shown that the recombination-tunnel current mechanism is realized under a forward bias and both trap-assisted tunneling and trap-charge limited current determine carrier transmission under a reverse bias. UST leads to decrease of the tunneling parameter (α), the saturation current (I_0), the trap activation energy in the diode base (E_X) as well as to increase of both the shunt (R_{SH}) and the series (R_S) resistance, the barrier height (V_d), the energy level of traps, which are located in the space charge region. Some parameters are subjected to the complete (E_X , R_{SH} , α , R_S activation energy) or partial (V_d , R_S value) recovery after the sample storage at room temperature. On our opinion, the observed effects deal with the acoustically induced defect generation.

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- [2] M. Sheinkman *et al.*, *Mat. Sci. Forum* **196-201**, 1467 (1995)
- [3] O. Olikh, K. Voytenko, and R. Burbelo, *J. Appl. Phys.* **117**, 044505 (2015)

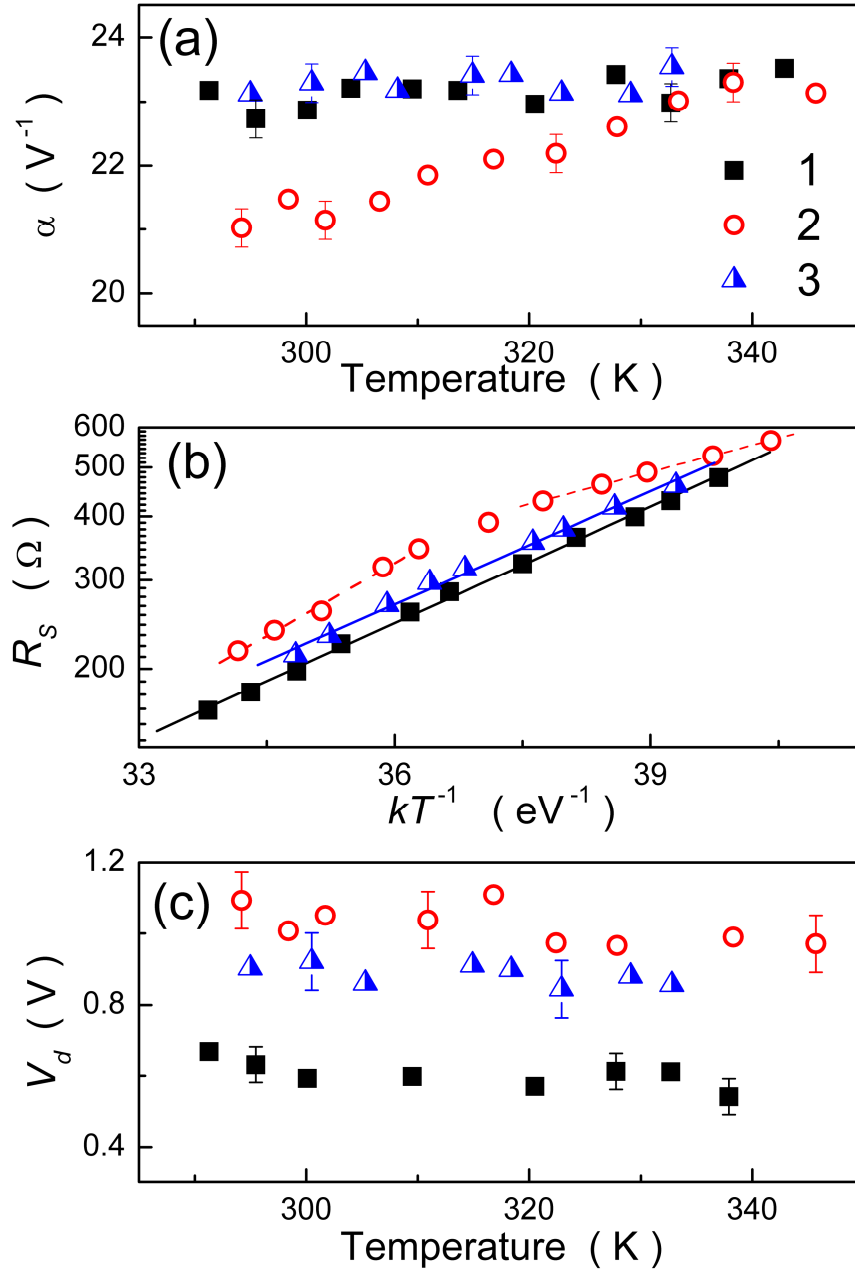


Figure. Temperature dependencies of tunneling parameter $\alpha = d(\ln I)/dV$ (a), series resistance (b) and barrier height (c). The measurements were taken before UST (curves 1, squares), immediately after UST (curves 2, circles), and after UST and ~ 75 h room temperature storage (curves 3, triangles).