**Ultrasound Action on Electronic Properties of Silicon / PEDOT:PSS Interface**

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It is widely recognized that ultrasound can serve as an effective tool for influencing defects in semiconductors. Similar effects have been observed in Si/SiO₂ structures [1]. This study presents the results of acoustically induced annealing of radiation defects in γ-irradiated silicon MOS structures.

The experiments revealed that gamma irradiation (60Co source, 5·10⁷ rad) of Au-SiO₂-Si structures alters the current mechanism under low bias conditions (<1 V) (see Fig. 1a). In the pristine structures, thermionic emission (TE) over the potential barrier was the dominant process. However, after irradiation, the *I*-*V* characteristics align with a power-law behavior. A slope value of ~1.3 suggests the presence of space-charge-limited current with an exponential distribution of trap density. In this context [2]:

, (1)

where *Nt* is the density of traps, *l* is the parameter given by  and *EC* is the characteristic energy of traps distribution. The activation energy (0.32 eV), determined from the temperature dependence of the current, suggests that the primary SCLC defects are Pb centers.

Ultrasound treatment (4 MHz, 2 W/cm², room temperature) of the irradiated MOS structures was performed using two consecutive loading-unloading cycles, each lasting 30 minutes. The total treatment time was either 30 minutes (UST30) or 60 minutes (UST60). Under the influence of ultrasound, an increase in *l* (broadening of the trap energy distribution) and a decrease in *RSCLC* (reduction in the trap total concentration *Nt*) were observed. Analysis of the reverse current showed that UST also reduces the concentration of E′ centers, which actively participate in trap-assisted tunneling processes. In our opinion, the observed defect annealing can be attributed to the acoustically stimulated diffusion of interstitial oxygen and hydrogen atoms.

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A 70 nm thick PEDOT:PSS (Al 4083) layer was deposited by spin coating.

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| *Figure 1: The density of states profiles for silicon / PEDOT:PSS structures manufactured with (curves B, C, E, and F) and without ultrasound loading (A and D). Type of ultrasound vibration: longitudinal (B, E), radial (C, F). The velocity of spin coating, rpm: 3000 (A, B, C, panels a and c), 5000 (D, E, F, panels b and d). The bias voltage, V: 0 (a, b), 0.4 (c, d).* | |

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| *Figure 2: Built-in potential (a) and voltage of effective hole injection (b) for silicon / PEDOT:PSS structures manufactured with and without ultrasonic loading. The sample designation coincides with Fig. 1.* |