Supplementary information

The effect of doping Sb in $Ge_{0.6}Se_{0.4}$ on the electronic structure and the characteristics of Ovonic Threshold Switching devices

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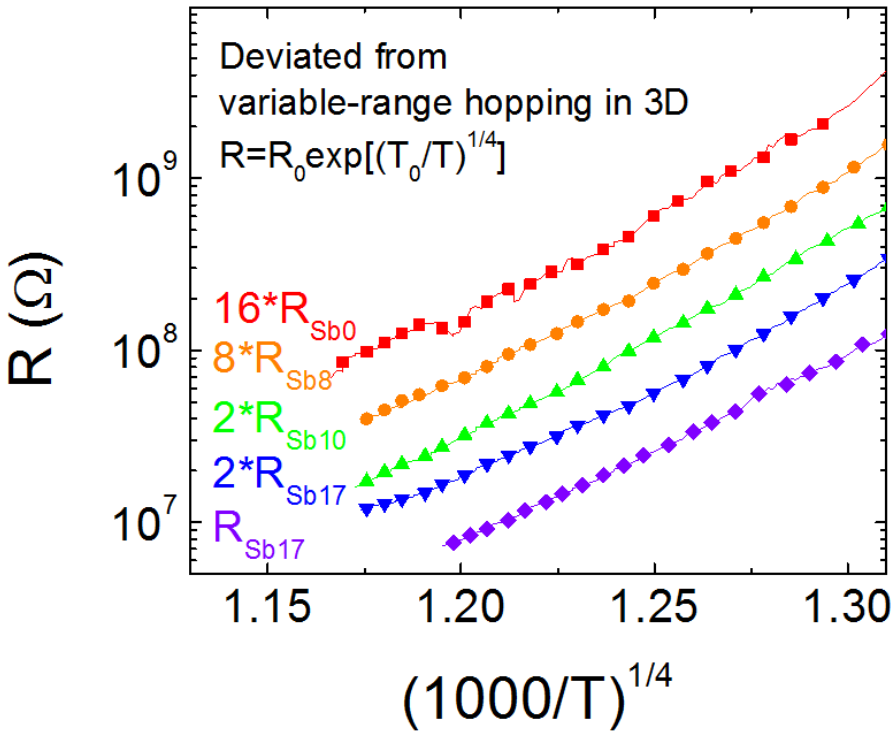

Figure S1. Semilog-plot of the resistance (R) of the $Sb_x(Ge_{0.6}Se_{0.4})_{1-x}$ films as a function of $(1000/T)^{1/4}$. The curves are deviated from the linear dependence meaning that the T-dependence of R is not well fitted to the variable-range hopping model.

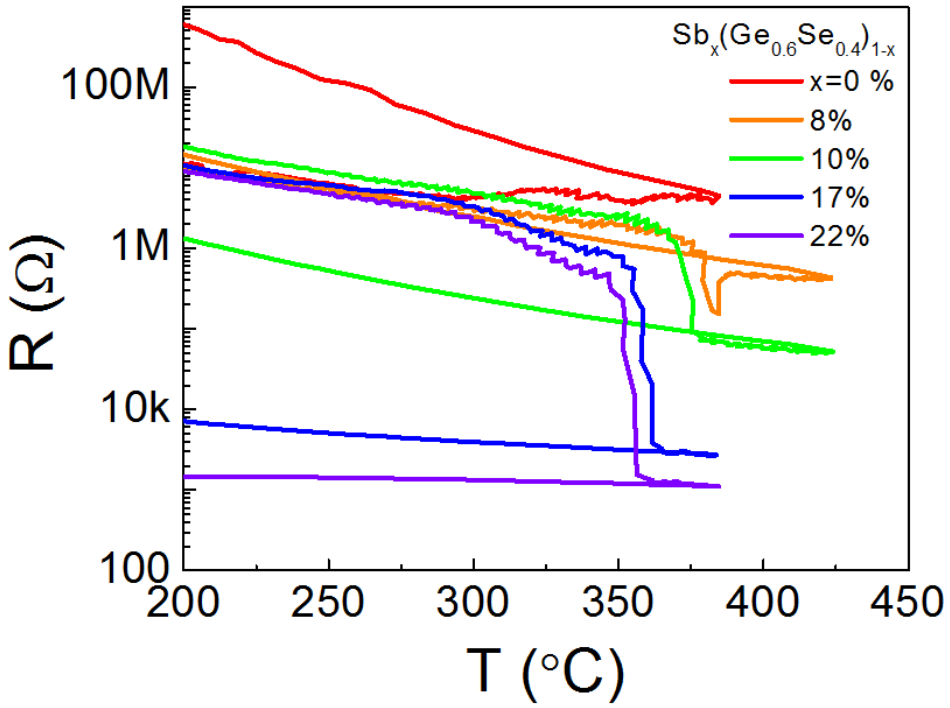

Figure S2. Semilog-plot of the resistance (R) of the $Sb_x(Ge_{0.6}Se_{0.4})_{1-x}$ films as a function of T. Films with x>0.08 showed a drastic change at a certain temperature due to crystallization. However, the lowest crystallization temperature (for x=0.22) is higher than 350 ^{o}C.

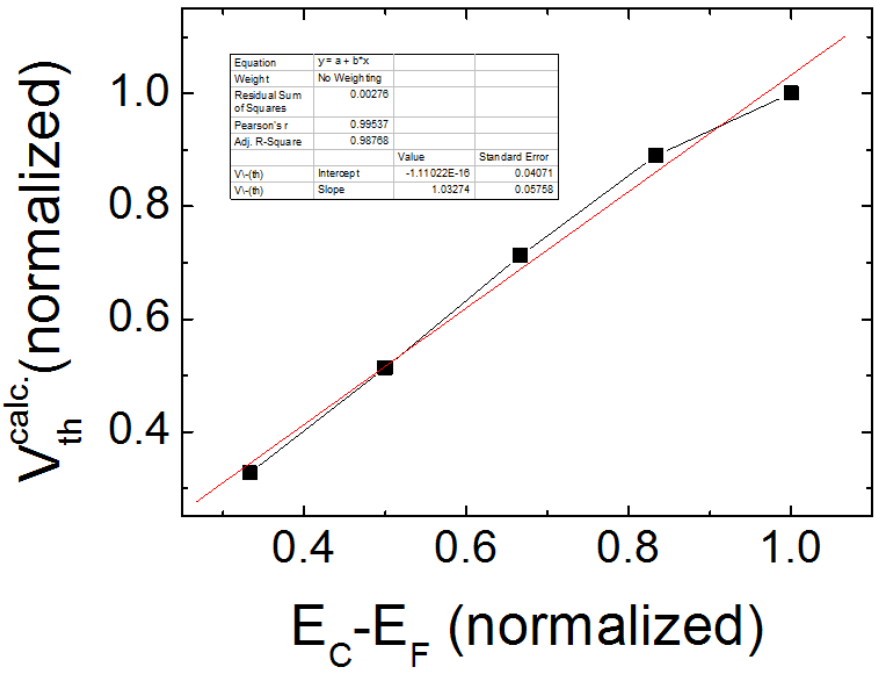

Figure S3. Energy gap (E_g~2*(E_C-E_F)) dependence of the threshold voltage (V_{th}), which is calculated from the Ielmini's model. (ref. 5 and 6 in the main text)

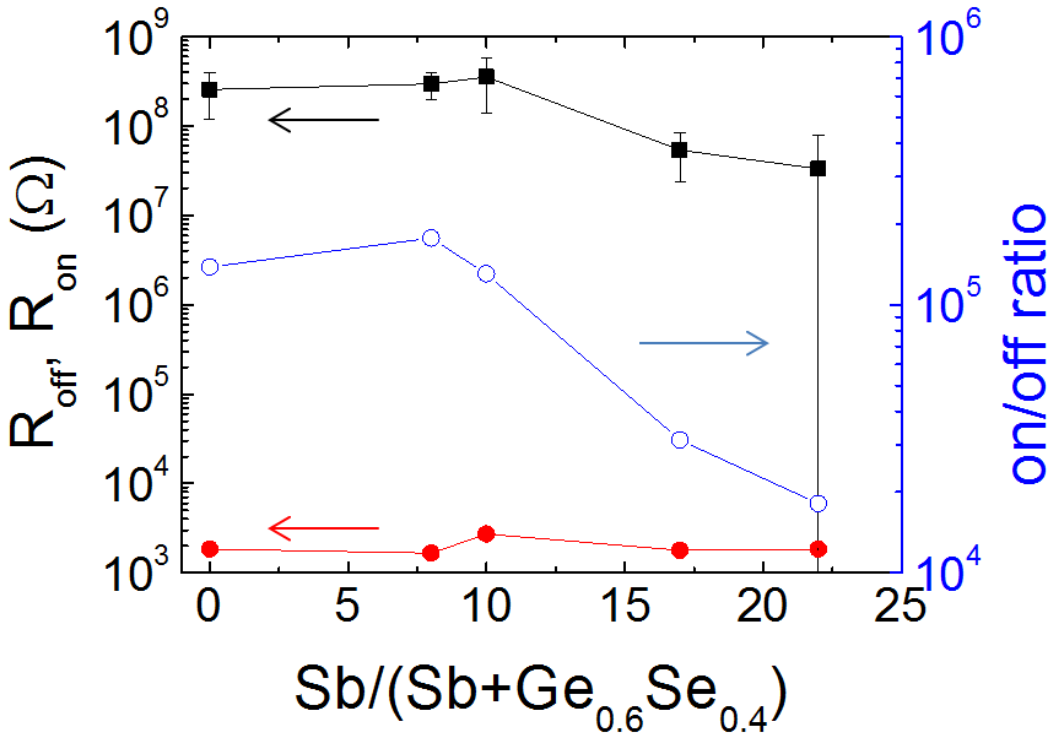

Figure S4. (Left axis) R_{off} (black square) and R_{on} (red solid circle) as a function of Sb contents. The error bars represent the standard deviation. (Right axis) R_{off}/R_{on} (blue open circle) as a function of Sb contents.