# SbSI Single Nanowires as Humidity Sensors

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Humidity sensing using one- and two-dimensional nanostructures is investigated in many research centers around the world. The sensors constructed from nanomaterials have received great attention because of their enormous surface-to-volume ratios. It makes their electrical properties extremely sensitive to species adsorbed on surfaces.

Antimony sulfoiodide (SbSI) is a semiconducting ferroelectric. Recently, the influence of humidity on impedance spectra [1] and photoconductivity transient characteristics [2] of SbSI gel, made up of large quantity of nanowires, has been studied. In order to obtain simpler image of the observed phenomena, the experiments with single SbSI nanowires are analyzed in this paper. Measurements of photocurrent transient characteristics (Fig. 1a) have been performed for different relative humidities in ferroelectric phase (T=280 K) using argon laser (λ=488 nm). Figure 1b presents the influence of water vapor on DC conductivity and photoconductivity of SbSI single nanowires. While negative photoconductivity is observed for SbSI gel [2], only the positive effect occurs for single SbSI nanowires, even for high RH.

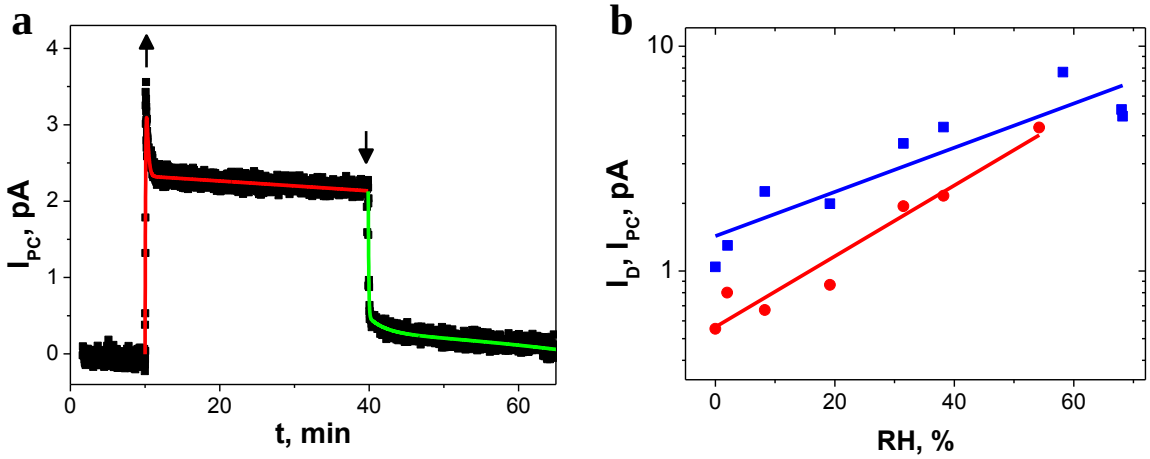


Fig. 1. Photoconductivity current response for RH=38% (a) on switching on (↑) and switching off (↓) illumination (solid curves show the fitted theoretical dependences) and (b) influence of humidity on dark current (■) and photocurrent (●) flowing through single SbSI nanowires in moist $N_2$ (T=280 K; p=4·10$^4$ Pa).

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[1] A. Starczewska, M. Nowak, P. Szperlich, B. Toroń, K. Mistewicz, D. Stróż, J. Szala, *Sensor. Actuat. A-Phys.* **183**, 34 (2012).
[2] M. Nowak, K. Mistewicz, A. Nowrot, P. Szperlich, M. Jesionek, A. Starczewska, *Sensor. Actuat. A-Phys.* **210**, 32 (2014).