Effect of the electron beam exposure on the electrical properties of the nanodevices based on Transition Metal Dichalcogenides

Michał Świniarski
Karolina Czerniak-Łosiewicz, Jakub Sitek, Arkadiusz P. Gertych, Małgorzata Giza, Mariusz Zdrojek
Faculty of Physics, Warsaw University of Technology, Koszykowa 75, 00-662, Warsaw, Poland
michal.swiniarski@pw.edu.pl

The single or few layers of the TMDs tends to be sensitive to the electron beam exposure [1], [2], which opens a new possibility in changing its properties, especially for our needs. The *material on-demand* approach is now enhanced with another technique, which allows a precise trim of the devices [3]. The next step is to understand the physics of this process, and use it to control the electrical properties of the new nanodevices.

In this work, we would like to present how the electron beam influences the electronic properties of the WS_2 single layers. For this purpose, we fabricated the nanodevices on the TMDs in the FET architecture to control how the electrical properties are changing with the progressive electron beam exposure (dose). We focused on the two aspects: (a) How the performance of the devices changed with the electron dose, such as mobility, threshold voltage, sub-threshold swing. (b) The *in-situ* change of the source-drain current of the TMDs devices. The presented study shows how the electron beam could be used to control the performance of the nanodevices based on new low-dimensional TMDs.

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References

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[2] M.-Y. Lu *et.al.*, Phys. Chem. Chem. Phys., 20 (2018), 9038
[3] S.-J. Lee *et.al.*, Nature Electronics, **3** (2020) 77-78.

Figures

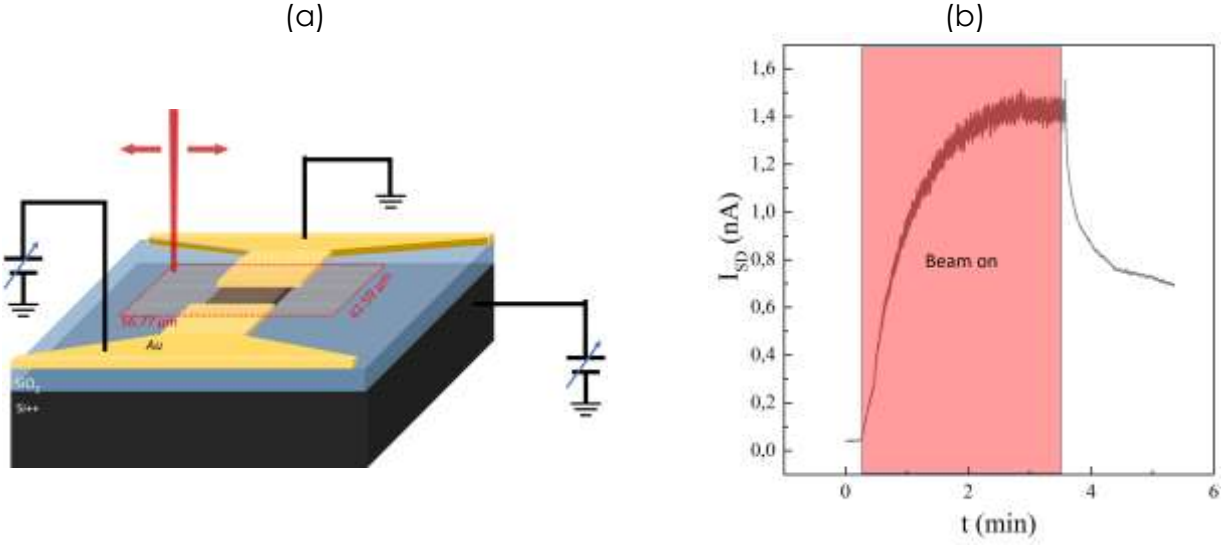

Figure 1: (a) The scheme of the experiment. The device is controlled during exposure inside the SEM chamber. (b) The source-drain current *in-situ* control during exposure.