Electric Transport Properties in the 2D-MoS_2

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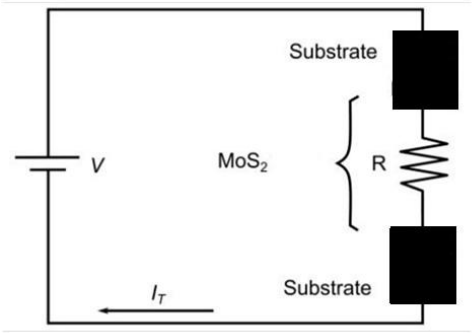
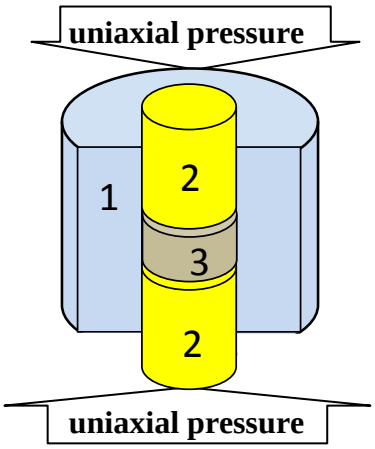
The growing need for the development of new semiconductor devices, the size of which is constantly decreasing, has sparked a resurgence of interest in the study of 2D materials that have a number of physical characteristics that differ from the bulk material. Thus, high Young's modulus and fracture strength make it possible to use such materials to modify their properties by means of compression, and open up a wide range of options for adjusting material properties. It is noted that 2d-MoS_2 is very sensitive to deformation, which leads to modulation of its electrical conductivity, in particular, it is assumed that it can demonstrate a transition from a semiconductor to a metal. This relationship between electrical and mechanical properties makes 2d-MoS_2 a promising material for nanoelectromechanical systems.

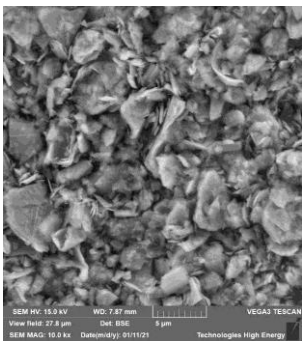
The electric transport characteristics in the 2d-MoS_2 samples consisting of the nano particles powder produced by the Sigma-Aldrich company have been studied under the conditions of uniaxial pressure at different temperatures.



Schematic diagram of the experiment

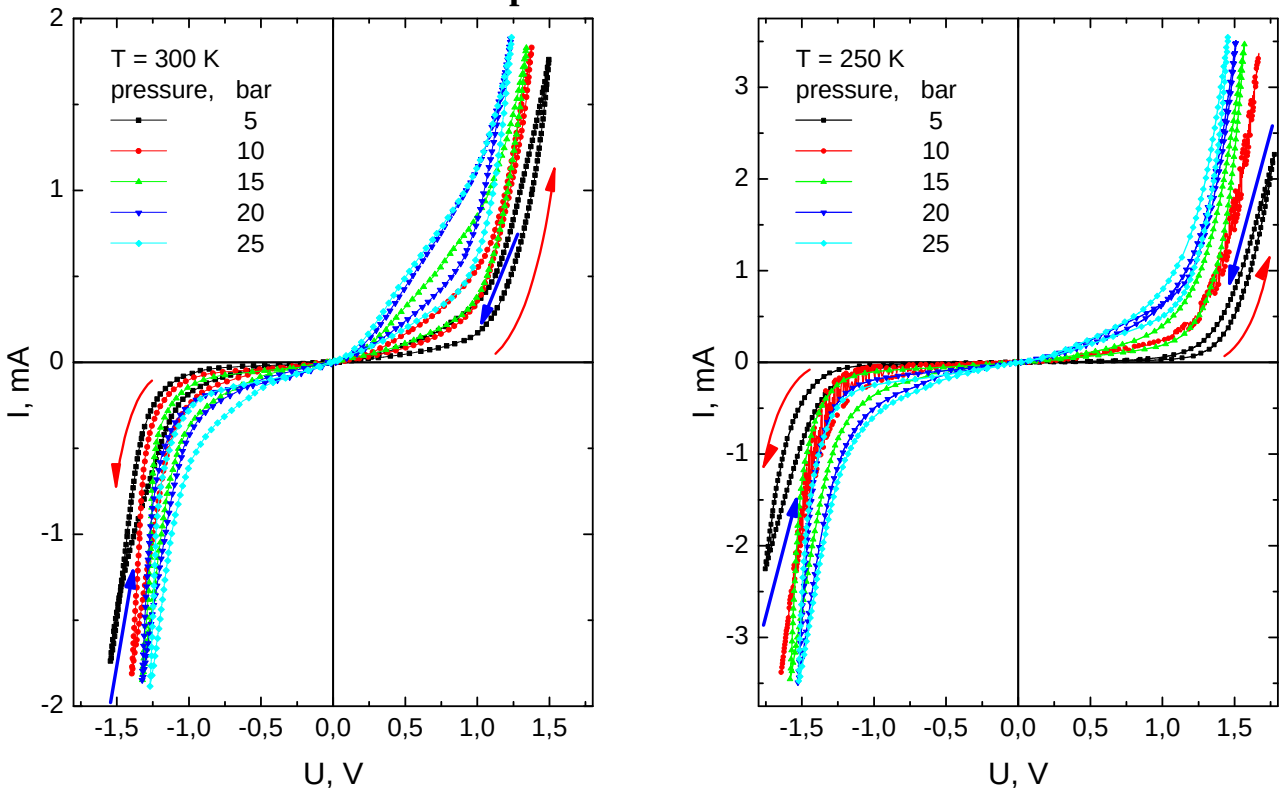


1 - Teflon tube; 2 - steel plungers; 3 – sample.



Sample

Experimental results



The current-voltage characteristics (CVC) of the samples were measured in the temperature range from (77 – 300) K, electric voltage range (0 – 2) V, uniaxial compression range (5 – 25) bar

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