Thermal evolution of the metal/PtSe2 systems studied by Raman Spectroscopy

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The discovery of graphene and its physical properties started a new era in the investigating of thin layer materials[1,2]. Today, these materials also include Transition Metal Dichalcogenides(TMD), which provide a wide range of physical properties, such as the values of charge carrier mobility and bandgap energy, which depend on the layer thickness[3,4]. One of the most promising TMD materials is PtSe2 with predicted high charge carrier mobility at room temperature(RT). In that case, it is crucial to determine the physical properties of the thin layer as an active channel in the planar sensor device. To fully understand of the formed interface metal/PtSe2 interface, it is necessary to perform measurements to give insight in to the active channel and interface physical properties both at RT and during thermal treatment. In that case, one of the most crucial methodologies is Raman spectroscopy allow analyze of the characteristic mods' position transform it into the change of the doping and stress level in the sample PtSe2[5,6].
The properties of the active layer of PtSe2, especially the changes in the stress and doping type levels at RT and during elevated temperature(up to 473K) will be discussed in this presentation. Simultaneously emphasis will be placed on the properties of the metal(eg.Ti,Ni,Pt)/PtSe2 interfaces and the impact of the deposited metallic layer and thermal treatment on the PtSe2 bulk transformation. The application of the temperature dependent correlation plots allows the determination of the temperature range work of PtSe2 based system for a potential planar device will be presented and discussed.
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