The Optoelectronic Property of Single CdSe Nanowire/monolayer Graphene Heterojunctions

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Graphene has attracted wide atterntions since first discover in 2004[1] [2] and then awarded Nobel Prize in 2010 , because of its exceptionally high crystal and electronic quality[3]. However, as a strictly two-dimensional material with zero-gap, its optoelectronic property is not good enough. Considering the excellent luminescent material CdSe whose badgap is 1.74eV at 300K[4] [5], we constructed heterojunction structure based on a single CdSe nanowire and a monolayer graphene.

Here, graphene have been synthesized via a simple chemical vapor deposition method on Cu chip[6], and then transferred to a clean silicon substrate with 300nm oxide layer. The CdSe nanowires have also been synthesized via a simple chemical vapor deposition method at 0.5Mpa in a horizontal quartz tube furnace[7]. After the electrodes on graphene were done, the CdSe nanowire was transferred from silicon substrate to across on the graphene directly by glass fiber under an optical microscope.

Under wavelength-635nm, power-10mV red laser irradiated, the device should show some interesting phenomenons[8] [9] [10]. However, a similar phenomenon in our experiment did not be found. At the same time, this device just has a weak backgate modulation.

We will put much more attentions on the performance of the device, more and better results can be expected.

References

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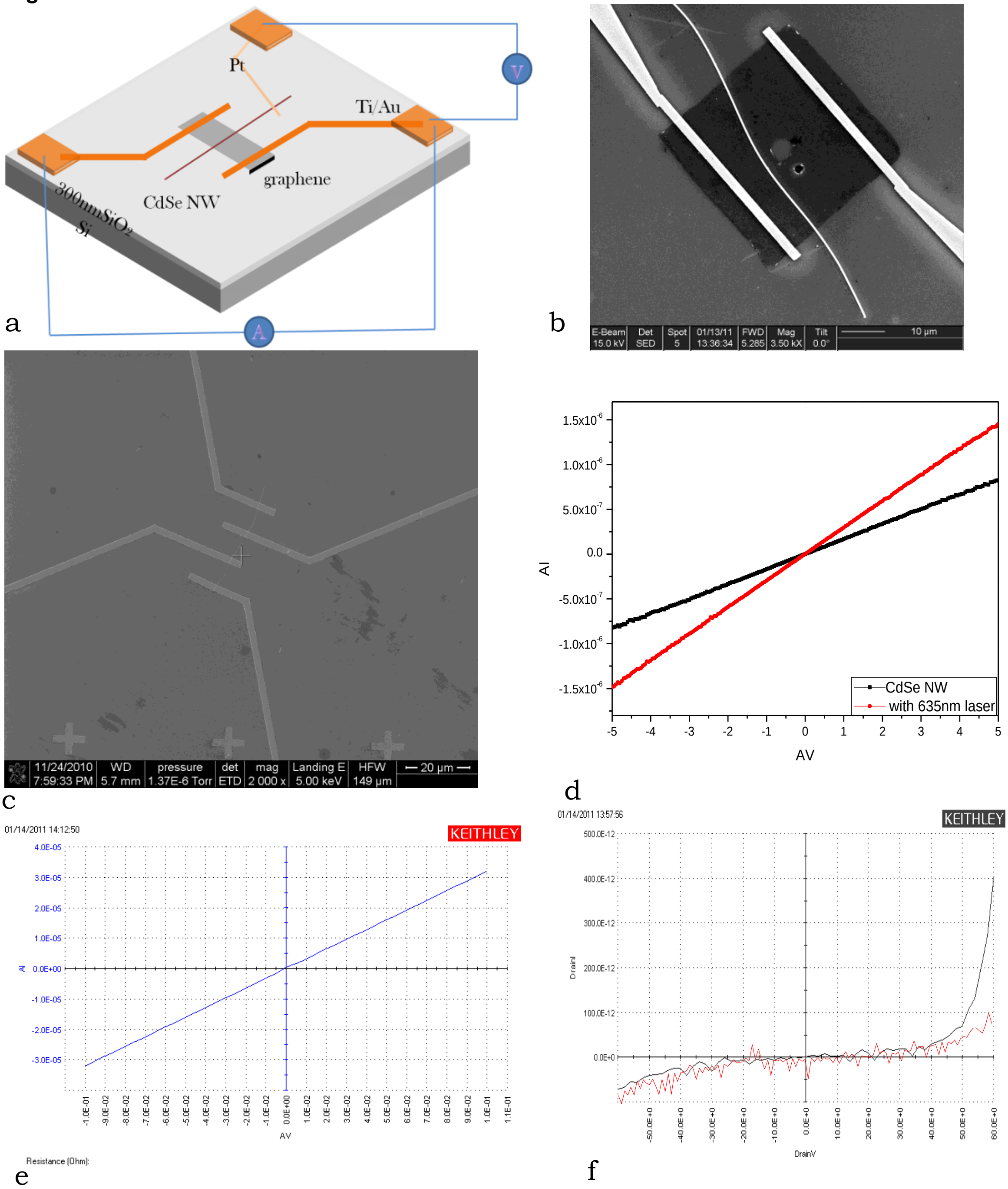
Figures



(a) Schematic picture of the heterojunctions and the schematic test circuit; (b) SEM image of the heterojunctions; (c) SEM image of the CdSe nanowire device; (d) I/V curves of CdSe nanowires device; (e) I/V curve of graphene; (f) I/V curves of CdSe Nanowire/Graphene heterojunction with backgate, red-0V, black-80V.