UV Photodetector based on Graphene-WS$_2$ Quantum dots

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Abstract :

We report a study on the fabrication and characterization of ultraviolet photodetectors based on graphene-WS$_2$ quantum dot heterostructure on SiO$_2$ substrate. The UV photodetector heterostructure interface between WS$_2$ quantum dots and graphene on a SiO$_2$ platform have been studied for their future applications towards optical devices. The size, height, and agglomeration limit of the WS$_2$-QDs samples were characterized by using AFM. The quality and uniformity of WS$_2$-QDs onto SiO$_2$ substrate were characterized by Raman spectroscopy. The current-voltage characteristics of the devices under UV illumination have been performed in the room temperature demonstrated a high sensitivity to UV light and the measured photo-generated current was 37.3µA at a bias of 5 V.
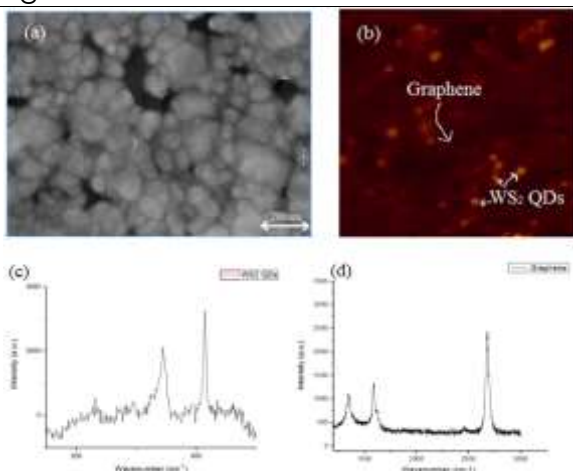
Figures

Figure 1: SEM image of agglomerated WS$_2$ QDs (b) AFM of WS$_2$ QDs-Graphene (c)Raman Spectra of WS$_2$ QDs (d)Raman Spectra of Graphene)
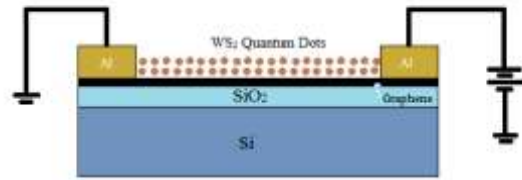

Figure 2: Schematic of WS$_2$ QDs-Graphene UV photodetector

Figure 3: Dark and photo illuminated currents of WS2 QDs- graphene photodetector.

Conclusion

The device reported is a low cost highly stable CMOS compactble having excellent device properties. The fabricated UV detector also has excellent detectivity of 3.136 ×1012 mHz1/2 W-1 when illuminated from UV sourse of 365 nm.

References

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