Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Tunable *p*-type doping of Si nanostructures for near infrared light photodetector application

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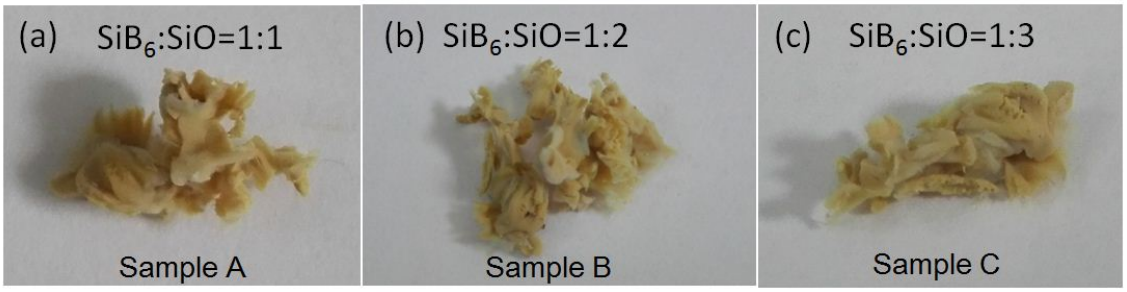

Figure S1. Digital camera pictures of the as prepared silicon nanostructures (Sample A, B, and C).

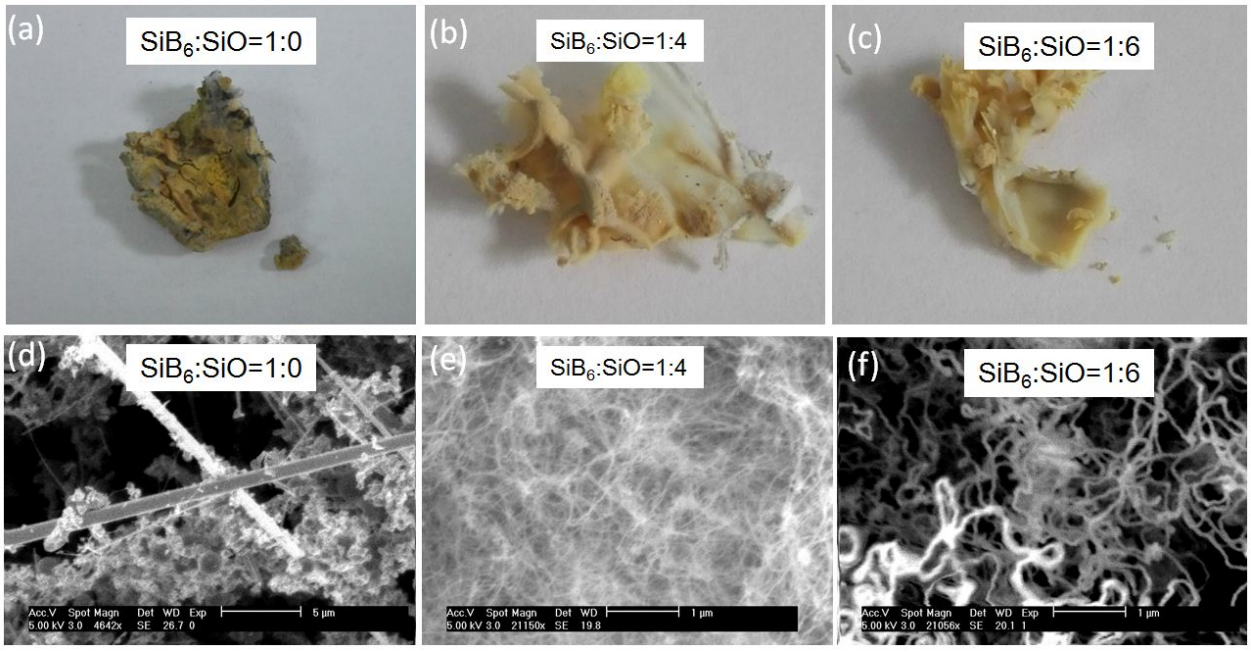

Figure S2. Digital camera pictures and SEM images of products obtained from a mixed powder of SiB_6 and SiO in the ratio of 1:0 (a, d), 1:4 (b, e), and 1:6 (c, f), respectively.

Table S1. Standard deviation of B% as a function of multiple preparation attempts for Sample A

	NO. 1	NO. 2	No. 3	No. 4	No. 5
B% of sample	1.28%±0.015	1.31%±0.014	1.27%±0.011	1.30%±0.016	1.29%±0.013

The synthesis of the monolayer graphene: The monolayer graphene in this study was synthesized by a Cu-assisted chemical-vapor deposition method,[1] which was carried out in high temperature three-zone tube furnace at 1000 ^{0}C using a mixed gas of CH_4 (40 SCCM) and H_2 (20 SCCM) as reaction source, and 20 μm as collection substrate. After synthesis, the monolayer graphene was spin-coated with 5wt.% polymethylmethacrylate (PMMA) in chlorobenzene, and then the underlying Cu foil was etched by a Marble's reagent solution ($CuSO_4$:HCl:H_2)=10 g:50 ml:50 ml). The graphene film was then rinsed by distilled water to remove remaining ions. To analyze the structures of the as-deposited graphene, the graphene was directly transferred onto SiO_2/Si substrate and the PMMA was then removed by acetone.

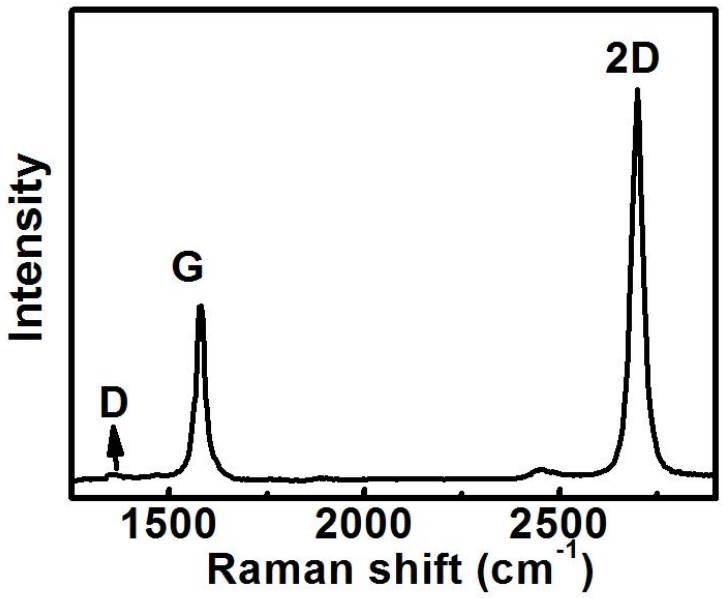

Figure S3. Raman spectrum of the monolayer graphene film, the inset shows a typical camera picture of the

graphene film on Si substrate.

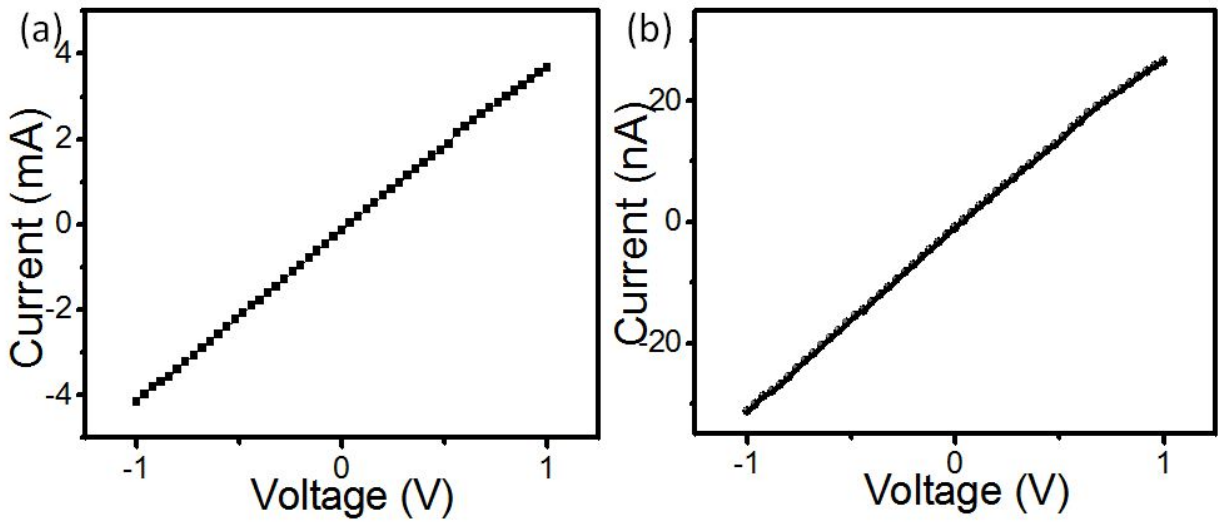

Figure S4. *I-V* curves of MLG/silver paste contact, and Ti/Au electrode/Si NW (Sample B) contact.

The concentration of boron in Sample C.

Although it is impossible to precisely determine the chemical concentration in Sample C by XPS, the boron contents can be calculated to be 8.11×10^{16} cm^{-3} by using the transfer characteristics of SiNW based FET. Thus the boron content in Sample C is $8.11\times10^{16}/5.03\times10^{22}=1.61\times10^{-6}$.

Reference:

1. B. Nie, J. G. Hu, L. B. Luo, C. Xie, L. H. Zeng, P. Lv, F. Z. Li, J. S. Jie, M. Feng, C. Y. Wu, Y. Q. Yu, S. H. Yu, *Small*, 2013, 9, 2872-2879.