

Microfluidic Tank Engineering and Functionalization of Two Dimensional MoS₂ by Nicotine

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Abstract

Incorporation of MoS₂ into logical applications it is obligatory to functionalize it with the chemical moieties.¹ To avoid the effect of solvent and dopant on the electrode we set up a microfluidic tank over the MoS₂ channel. Here we report the tailoring of electrical properties of mechanically exfoliated MoS₂ by nicotine. Raman spectroscopy and electrical charge transport measurement revealed that nicotine imposes n-doping in MoS₂.² The threshold voltage forwarded left side, indicating n-type doping effect. Nicotine functionalization tailored the field effect mobility by a factor of ~ 3.6 without deteriorating the electrical properties of MoS₂ devices.³ XPS analysis reveals the up shift of Fermi level of MoS₂ towards conduction bands after nicotine functionalization.

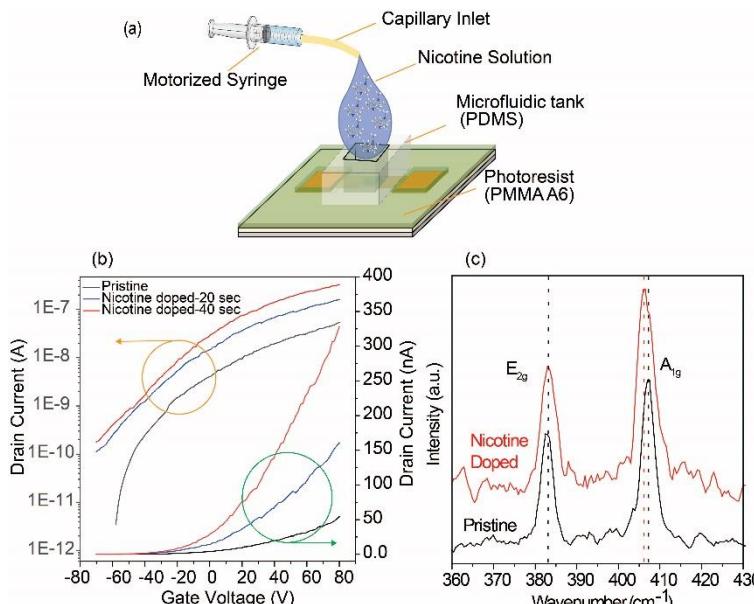


Figure. (a) Schematic illustration of MoS₂-FET with the microfluidic tank. (b) Transfer characteristics of the MoS₂-FET of before and after doping (c) Raman spectra of MoS₂ of pristine (black) and doped (red).

References

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2. Daisuke K et al., 2014 J. Am. Chem. Soc. 136 7853–7856.
3. Shaista A et al., 2015 Sci. Technol. Adv. Mater 16 035009.