Simple and scalable fabrication of MoS_2-based Ebola biosensor

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Abstract

We propose a facile and scalable method for the fabrication of flexible electrical sensors (Figure 1a) by exploiting the hydrophobic properties of exfoliated MoS_2 flakes which float on water, forming a compact layer. Water evaporation (Figure 1b) allows precipitating the flakes on the desired area. Choosing polyimide as support, a previously reported material for flexible sensor development [1], we fabricate flexible and light weight sensors that maintain their performance after bending under 14 mm radius, and still show conductivity at 1 mm radius (Figure 1c). We further apply them for Ebola detection by immobilizing antibodies against VP40 protein of the virus. A response in femtomolar concentrations is obtained (Figure 2) without cross-reaction toward Staphylococcal enterotoxin B (SEB), another toxin showing similar initial symptoms if ingested. This response is comparable to previous biosensors [2], but with the additional advantageous properties of facile and scalable preparation, light weight and flexibility. Such device would be an ideal candidate for rapid delivery to emergency areas where the lethal disease is suspected for prevention of the spread.

References

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Figures

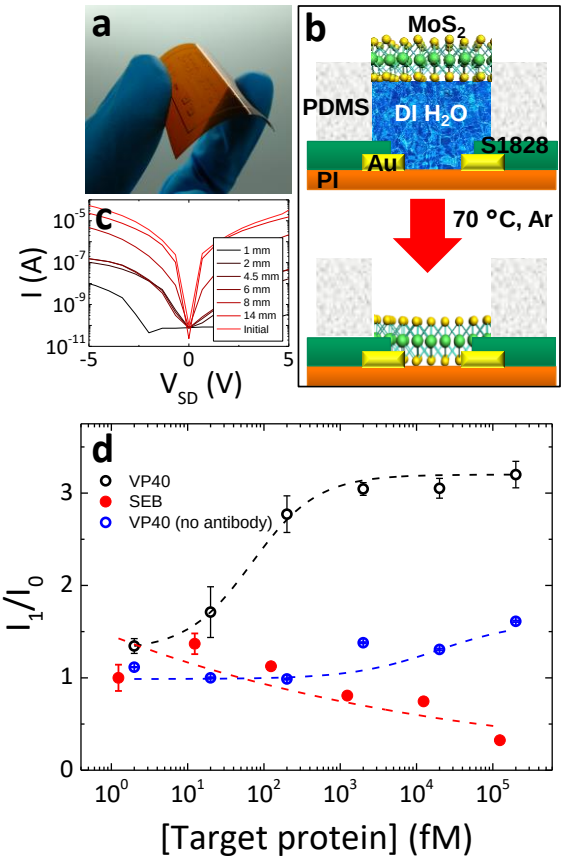

Figure 1: (a) Fabricated chip. (b) Fabrication process. (c) Bending test. (d) Biosensing response.