EPFL-TTO

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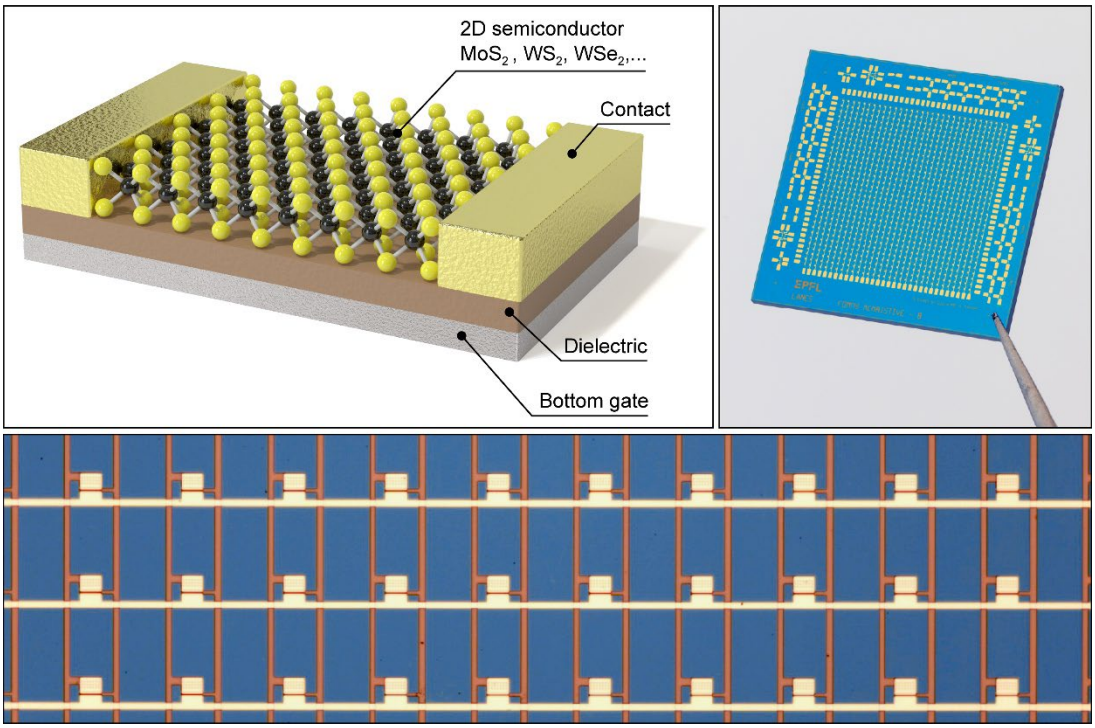
Licensing Opportunity

TTO – Technology Transfer Office

Semiconductor Device



Exemplary devices and circuits. Upper left: field-effect transistor with a 2D semiconductor as a channel, electrical contacts and a gate electrode. Upper right: Vector matrix multiplier (VMM) processor based on an MOCVD-grown 2D semiconductor, fabricated on wafer scale at EPFL. Lower panel: micrograph of a portion of a VMM circuit produced at EPFL.

Ref. Nr

6.1022

Keywords

2D semiconductors, scaled logic devices, in-memory computing

Intellectual Property

US20140197459A1

Publications

Nature Nanotech. 6, 147 (2011)
doi:10.1038/nnano.2010.279

Nature 587, 72 (2020)
Doi: 10.1038/s41586-020-2861-0

Nature Electronics (2023)
Doi: 10.1038/s41928-023-01064-1

Date

21/11/2023

Description

2D semiconductors such as MoS_2, WS_2 etc. could be an attractive alternative to silicon for the fabrication of transistors with sub-10 nm gate lengths due to a favorable combination of atomic-scale thickness, presence of a band gap and good electrical properties resulting in reduced power consumption.

The innovation consists of the use of 2D semiconductors in field-effect devices. Exemplary embodiments include field-effect transistors, photodetectors, floating gate memory devices which have recently been included by our group in large-scale integrated vector matrix multipliers.

Advantages

- Suitable for fabrication of scaled semiconductor devices
- Low power consumption due to Excellent electrostatic control and low dielectric constant resulting in reduced power consumption
- Absence of dangling bonds on the surface
- Breaking strain >11%
- Stable up to at least 1000°C in inert atmosphere
- Compatible with semiconductor fabrication processing, wafer scale processing

Applications

- Semiconducting electronics
- Digital electronics

Offering

- Licencing and/or collaboration