Graphenea

Technical Datasheet

Graphene Field-Effect Transistor Chip: S-22

General Description

The GFET S-22 chip from Graphenea is designed for measurements in liquid medium. The new version provides 4 independent set of graphene devices, each set with 3 individual channels, with encapsulation on the metal pads to avoid degradation and reduce leakage currents; the probe pads are located near the periphery of the chip. It also includes a non-encapsulated electrode at the center of the chip, which allows liquid gating without the need of an external gate electrode (such as Ag/AgCl probes). This device architecture enables each one of the set of devices to be modified individually, to obtain a multiplexed measurement.

Features

- State-of-the-art GFETs utilizing Graphenea's established consistently high-quality graphene
- Semiencapsulated geometry + central gate electrode for measurements in liquid environments.
- Perfect platform device for new sensor research and development
- 4x3 GFETs per chip. Multiplexing.
- Mobilities typically in excess of 1000 $cm^2/V{\cdot}s$

Applications

- Graphene device research
- Biosensors
- Chemical sensors
- Bioelectronics

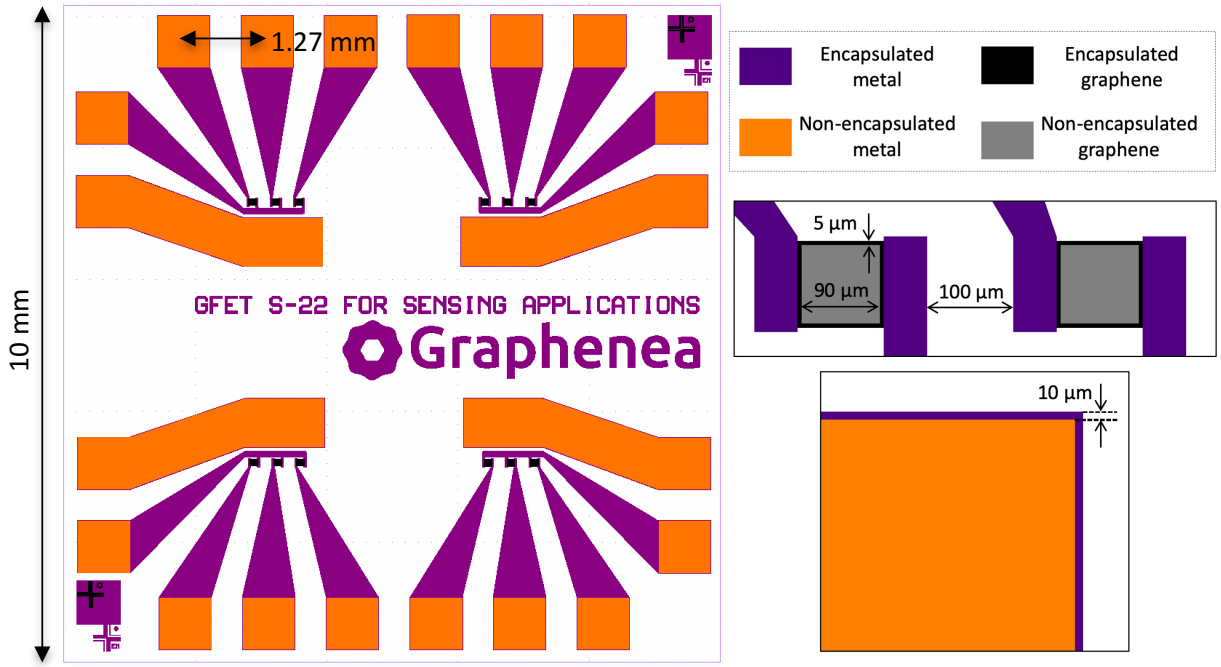
Typical Specifications

Chip dimensions	10 mm x 10 mm
Chip thickness	675 µm
Number of GFETs per chip	12 in parallel
Gate Oxide thickness	90 nm
Gate Oxide material	SiO_2
Resistivity of substrate	1-10 Ω·cm
Metallization	Chromium/Gold 5/45nm
Encapsulation	50 nm Al_2O_3
Graphene field-effect mobility	>1000 $cm^2/V{\cdot}s$
Dirac point (liquid gating PBS 1M)	<1 V
Yield	>75 %

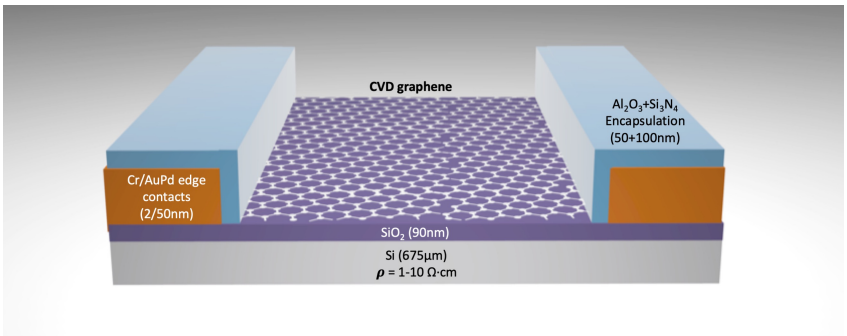
Absolute Maximum Ratings

Maximum gate-source voltage (liquid gating in PBS)	± 2V
Maximum temperature rating	150 °C
Maximum drain-source current density	10^7 $A{\cdot}cm^{-2}$

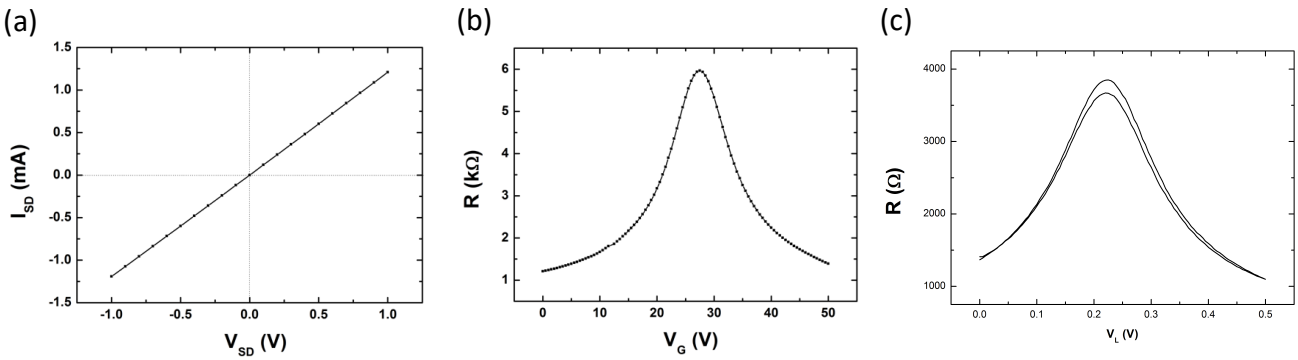
GFET-S22 Layout



Device cross-section



Typical characteristics



(a) Output curve, measured at room temperature and vacuum conditions. (b) Transfer curve under back gating measured at source-drain voltage of 240mV, under same conditions as (a). (c) Transfer curve under liquid gating through Phosphate Buffered Saline (PBS, pH=7.3), using the on-chip electrode as gate electrode.