



GaN-ON-SILICON

An imec industrial affiliation program in “More than Moore”

Imec’s proprietary Gallium nitride (GaN) on silicon epi technology is the foundation to the development of low cost and high performing GaN-on-silicon power devices and LEDs on 4”, 6” and 8” silicon wafers in a CMOS compatible processing environment.

TECHNOLOGY

Imec has developed over the last decade a strong know-how on III-nitride compounds such as GaN. Known for its strength in Si CMOS development, imec wants to facilitate the adoption of III-nitride compounds by:

- ▶ making the fabrication processes CMOS compatible;
- ▶ depositing GaN on large-wafer Si substrates;
- ▶ leveraging on Si scale of economics.

Outstanding achievements have been realized at imec with its GaN-on-Si technology: high breakdown voltages and low specific on-resistance have been demonstrated, positioning imec among the few technology leaders in GaN-on-Si.

APPLICATION FIELDS

▶ POWER ELECTRONICS

Due to its wide bandgap, GaN offers breakthrough solutions in terms of high-voltage and/or high-current device operation at high working temperatures and frequencies while significantly reducing both the conduction and switching losses.

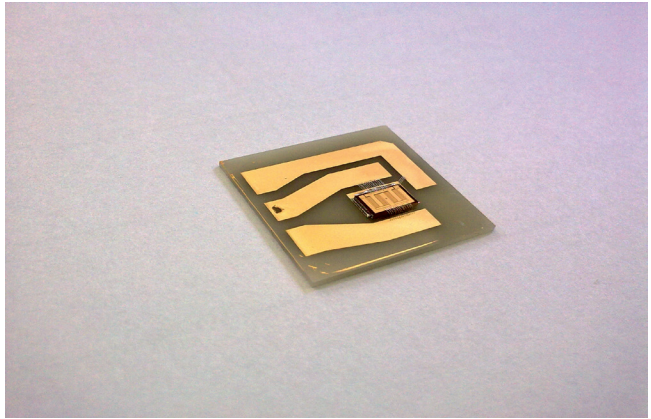
▶ LEDs

GaN exhibits excellent light emission properties in a very broad range of the visible and ultraviolet (UV) spectrum. However, solid state lighting by these devices can only become broadly acceptable if new large-volume manufacturing processes are developed that enable 150lm/W LEDs at competitive costs.

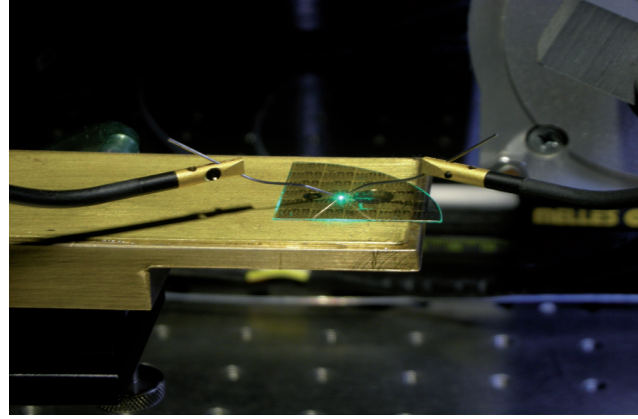
COMPETITIVE ADVANTAGES

Imec offers low strain, crack free, flat and smooth HEMT quality GaN epiwafers on 4” and 6” silicon wafers.

A key feature of imec’s technology is its proprietary in-situ passivation process by capping the top layer with SiN MOCVD-grown layer. This gives extremely good control of the surface impact on the device performance. Thanks to this unique process, imec demonstrated high device performances exhibiting very low dispersion issues over the entire surface of the wafer. Additionally, the process offers a unique approach for enhancement-mode switching transistors.



01
SiN/AlGaIn/GaN field effect transistor.



02
GaN LED on sapphire.

MORE INFORMATION

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WHAT WE OFFER

Imec offers large diameter GaN on 4" and 6" Si wafers for demonstration purposes.

In the framework of its GaN Industrial Affiliation Program, imec will develop reliable and cost effective GaN high-breakdown-voltage power-switching devices (>600V) and GaN-based LEDs manufactured on a fully 6" and 8" CMOS compatible process.

The long-term (5 years) goal of imec is to manufacture high-efficiency monolithic white nitride LEDs on large-diameter Si substrates (6" and 8"). The integration of imec's proprietary concept of surface roughening in combination with mirrors will allow a higher external quantum efficiency of thin-film textured LEDs.

The GaN-on-silicon program can rely on imec's high-end flexfab facility which is operated 24/7, runs 130/90nm CMOS, and is fully SPC controlled and ISO certified.

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