

TECHNOLOGY SOLUTION

Electrical and Electronics



Double Sided Si(Ge)/Sapphire/III-Nitride Hybrid Structures

Method to produce combination of devices on opposite sides of a sapphire substrate

BENEFITS

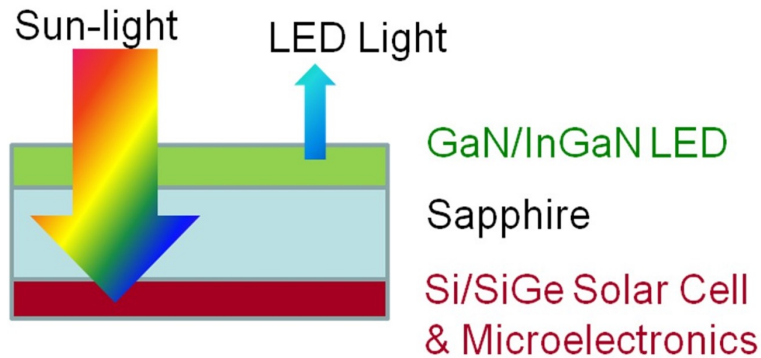
- Novel semiconductor device structure that combines two distinctly different semiconductor materials, each with separate performance strengths, to create novel hybrid devices.
- Transparent substrate can provide back side illumination of solar cell.
- Builds upon proven technologies

NASA Langley Research Center has developed a double sided Si(Ge)/Sapphire/III-Nitride hybrid structure. This technology uses both sides of a sapphire wafer to build device structures; on one side, making either Si or SiGe devices, and on the other side, making III-nitride device structures (e.g. GaN, InGaN, AlGaN). This innovation builds upon several previous innovations by NASA Langley Research Center, all relating to making silicon germanium semiconductor device structures on sapphire wafers.



THE TECHNOLOGY

III-nitride devices are commonly made on sapphire substrates today for various commercial electronic and optoelectronic applications. Thus, this innovation relates directly to the combination of devices on opposite sides of the sapphire substrate. One possible device combination is to have LEDs one side and solar cells on the other, such as for displays.



III-Nitride LED/LD structure on front side and Si/SiGe device layer on the back side

APPLICATIONS

The technology has several potential applications:

- Self-powered display
- Solar cell-LED display

PUBLICATIONS

Patent No: 9,449,818; 9,824,885

National Aeronautics and Space Administration

Agency Licensing Concierge

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