

# **Market and Technology trends in WBG materials for power electronics applications**

Hong LIN

Yole Développement, Le Quartz, 75 Cours Emile Zola – 69100 Villeurbanne – Lyon – France

Phone : +33 472 83 01 03, [lin@yole.fr](mailto:lin@yole.fr)

## **Introduction**

Wide bandgap (WBG) based technologies, such as GaN and SiC, are now commonly accepted as a reliable and pertinent alternative to the silicon based technology for power electronics applications. Most power module and power inverter manufacturers have already included it in their roadmap as an option or as a firm project. However time-to-market differs from application to application as a function of value proposals for cost, specifications, availability and so on...

While GaN and SiC reshape part of the established power electronics industry, other WBG materials, such as AlN, diamond, Ga<sub>2</sub>O<sub>3</sub>, are emerging. They are claiming to have even better properties and allow to further improve the performance of the power electronics devices.

This paper is intended to describe the market and technology trends in WBG materials for power electronics applications.

## **Purpose**

The intention of this paper is to

- 1) Provide an overview of GaN and SiC power electronics.
- 2) Provide an overview of emerging WBG materials, including AlN, Ga<sub>2</sub>O<sub>3</sub> and diamond.

## **What specific results were obtained?**

To provide an overview of GaN and SiC power electronics, the paper will discuss:

- 1) The technological and commercial barriers for GaN and SiC technologies.
- 2) Time to market for GaN and SiC power devices in different power electronics applications.
- 3) Market size in 2014 and its projection up to 2020 for GaN and SiC power devices.

To provide an overview of emerging WBG materials, including AlN, Ga<sub>2</sub>O<sub>3</sub> and diamond, the paper will:

- 1) Describe the key driver for the development of emerging WBG materials.
- 2) The main players.
- 3) Evaluate the potential of these materials for power electronics applications.
- 4) Yole's vision on the time to market of these materials.

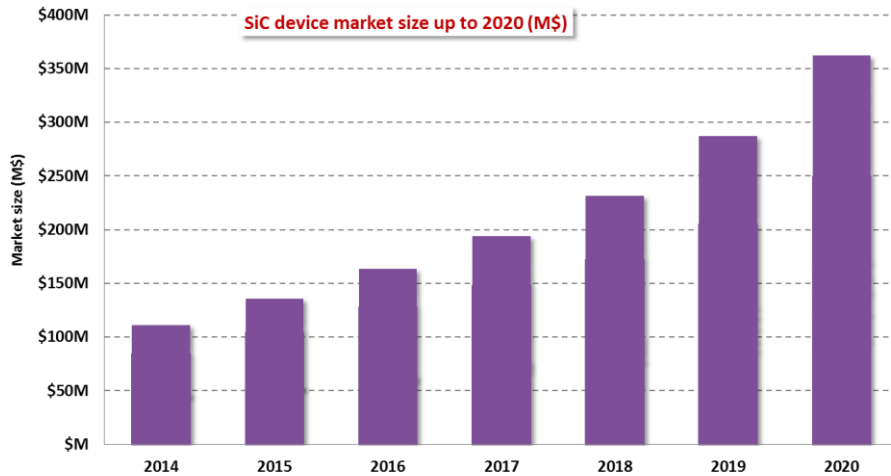


Figure 1 SiC device market size up to 2020

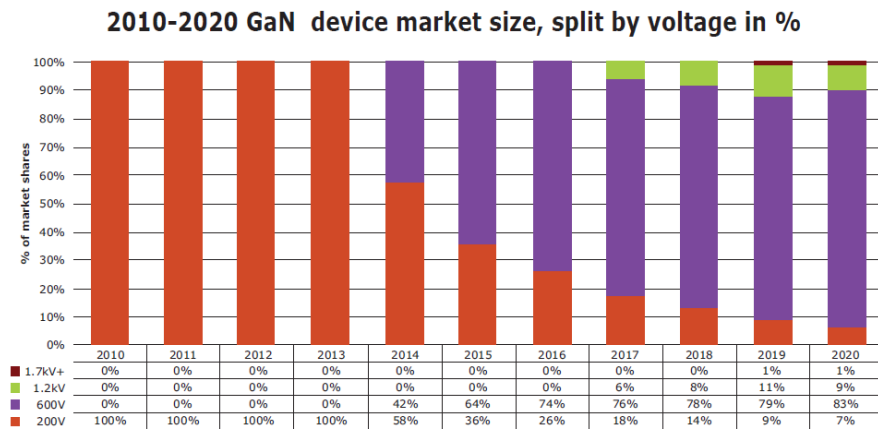


Figure 2: 2010-2020 GaN device sales device market size, split by voltage in percentage

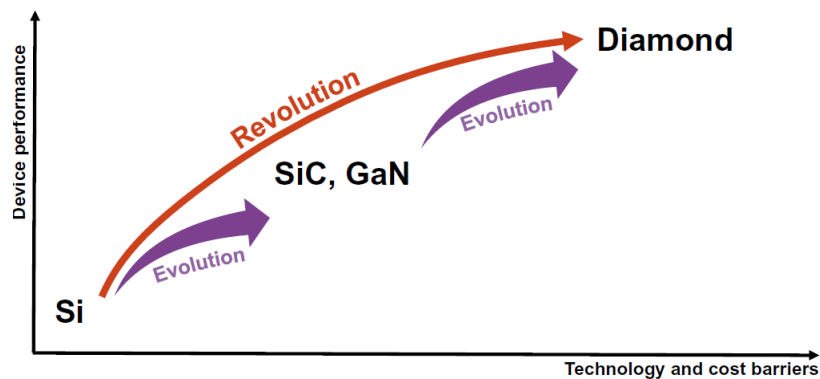


Figure 3: Two approaches within the semiconductor technology roadmap