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Toyoda Gosei Succeeds in Making Larger GaN Substrates for Next-Generation Power Devices

New technology will contribute to an energy-saving society

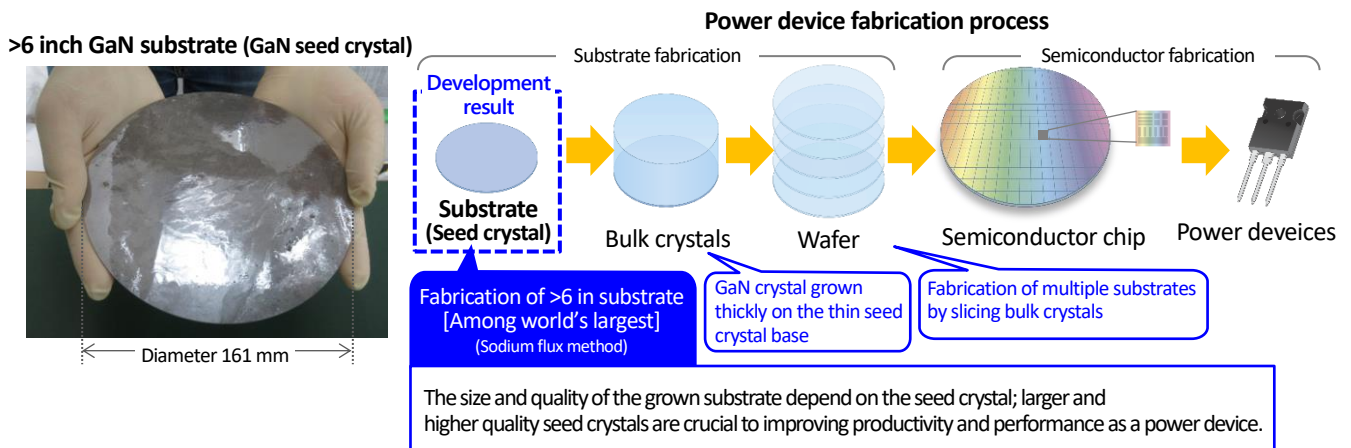
Kiyosu, Japan, March 15, 2022: Toyoda Gosei Co., Ltd., together with Osaka University, has succeeded in increasing the diameter of substrates for gallium nitride (GaN) power devices¹.

Power devices are widely used for power control in industrial machinery, automobiles, home electronics and more. As society moves toward carbon neutrality, the practical application and widespread use of next-generation power devices is promising as a means of reducing power loss when controlling large volumes of power in renewable energy equipment and electric vehicles. GaN power devices are one means for doing this, and higher quality and larger diameter GaN substrates are needed in the development of these devices to achieve higher productivity (cost reductions).

In a project headed by the Japanese Ministry of the Environment,² Toyoda Gosei and Osaka University have employed a method of growing GaN crystals in liquid metal of sodium and gallium (sodium flux method) to fabricate a high quality GaN substrate (GaN seed crystal) of over 6 inches, the world's largest level. They will next conduct quality assessments for mass production of 6-inch substrates, and continue improving quality and increasing diameter size (more than 6 inches).

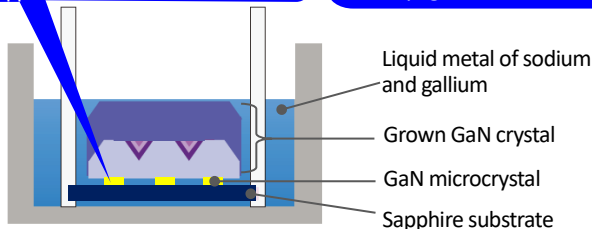
¹ Toyoda Gosei is leveraging its expertise in GaN semiconductors (blue LEDs and UV-C LEDs) in developing next-generation power devices.

² The leading innovation project for a decarbonized society and lifestyles using GaN technology; this is a large project that includes verification of CO₂ reductions from social implementation of applied products based on the development of GaN substrates.

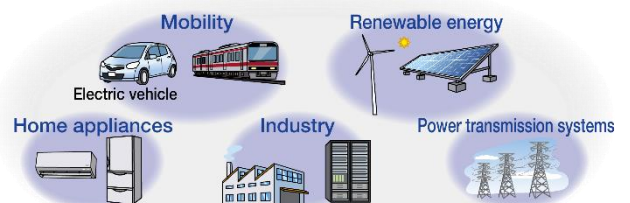


Key points in fabricating large diameter GaN substrates (Sodium flux method)

- (1) Blue LED production technology is applied to evenly distribute about 100,000 GaN microcrystals on an 8-in sapphire substrate
- (2) Uniform crystal growth and inhibition of impurities are achieved by improving the temperature control technology and modifying the raw material stirring method



Promising fields of use



**Reduction of power loss
⇒ CO₂ cut in entire power systems**