

Theme: Semiconductor Process

- Sub Theme: Heterogeneous 3D Integration (Beyond Si and III-V)

This theme aims for the Heterogeneous Integration of III-V or 2D material devices with Silicon devices.

- III-V based opto-electric material and devices are highly crucial for Silicon photonics and hybrid electronic devices. For example, selective epitaxy of lasing material and their fabrication of Edge Emitting-Laser (EEL) on Silicon substrate are important issues. In the same manner, transfer printing of Laser or III-V opto-electronics devices (FET, HEMT, CMOS, LED, Sensor) for integration of Silicon devices (ex. CMOS) is also considered important issues for heterogeneous integration.

- Reconfiguration approach enables wafer-level 3D heterogeneous integration of various kinds of chiplets or epi-level thin films arranged substrate with Si wafer. This functional substrate also includes each different materials (GaN, Si/Ge, GaAs, InP, etc.) and functional ICs or devices.

- The 2D materials would have to be remarkable device when they are integrated with conventional existing Si device when it comes to their electrical, thermal performance. Monolithic integration 2D materials is successful if wafer-level uniformity over 8-inches and CMOS compatible processing of 2D materials are possible. Also the monolithic 3D integration of TMD-channel devices(wafer-free) will cover for emerging device architectures including Logic-on-memory, Memory-on-logic, Logic-on-logic, Stacked memory integration with wafer/bump-less technology.

The specific topics of this theme are as follows:

- Heteroepitaxy & Transfer printing method and their applications. (Beyond Si or Beyond III-V)
- Laser devices integration or heteroepitaxy on Si substrate for Si-photonics.

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· New hybrid III-V devices integration on Si using Si compatible wafer-level processes.

· Monolithic 3D integration of TMD-channel materials and devices for revolution of electrical, thermal and form-factor on Si devices.

※ *The topics are not limited to the above examples and the participants are encouraged to propose the original idea.*

※ *Funding: Up to USD 150,000 per year*