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Photonic-electronic heterogeneous integration technologies

Viktor Krozer[1], Marko Rausch[1], Oleksandr Glubokov[1], Tanjil Shivan[1], Jonas Gläsel[2], Christoph Stölmacker[1], Adam Rämer[1,3], Christian Berger[1], Ralf Doerner[1], Maruf Hossain[1], Hady Yacoub[1], Patrick Runge[2], Wolfgang Heinrich[1], and Patrick Scheele[1]

[1] *Ferdinand-Braun-Institut, Leibniz Institut für Höchstfrequenztechnik Berlin, Germany.*
[2] *Heinrich Hertz Institut, Fraunhofer-Institut für Nachrichtentechnik Berlin, Germany*
[3]*now with Xavveo GmbH, Berlin, Germany*
Email: viktor.krozer@fbh-berlin.de.

Heterogeneous integration with large bandwidth approaching terahertz frequencies allow for higher speed and higher functional complexity in electronic circuits and enable heterogeneously integrated photonic electronic modules. Heterogeneous integration (HI) technology is an enabler for higher functional complexities and higher speeds, especially in More than Moore applications [1]. HI also allows for a reduction in size, weight, and power, enabling new capability and enhanced performance [2], [3]. In this presentation we discuss several technology approaches for semiconductor electronic and photonic integration. It is shown that bandwidth in excess of 300 GHz are attainable with interconnects placeable anywhere in a layout. A novel structure has be implemented for photonic electronic heterogeneous integration as depicted in Fig. 1. Here a photodiode in InP has been heterogeneously integrated with a transimpedance amplifier [4]. Bandwidth limitation will be discussed. It should be emphasized that for HI both components to be integrated have to be realized with a mirror layout. One advantage of the novel HI technology is the precise adjustment of the height between the two components.

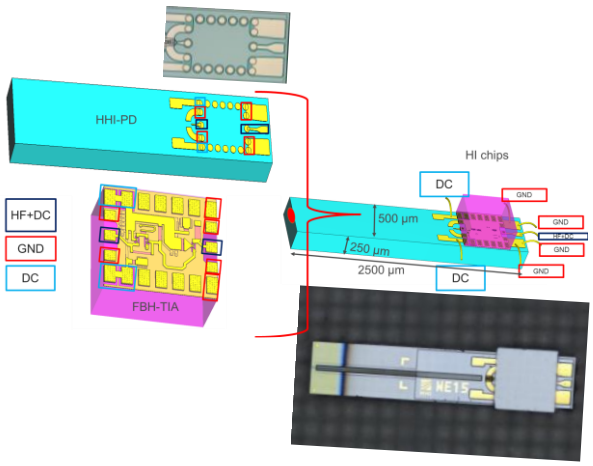

Fig. 1 Heterogeneous integration of photonic and electronic components into a compact module.

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