Bachelor / Master Thesis:

Electrical Packaging for Analog Optical Computing in Silicon Photonics

Karlsruhe Institute of Technology

Current demands for computing speed are challenging existing hardware concepts. In particular, electronic computers are unable to cope with growing needs for high-speed signal processing without significantly increasing power consumption. For some applications, migration of certain computing tasks from the electronic into the optical domain might represent a possible solution to overcome this limitation [1, 2]. At our institute, a first demonstrator device in silicon photonics has been designed and fabricated.

In order for any device to be practically usable, it must be easily accessible, both electrically and optically [3]. The high count of electric (DC and RF) and optical ports of the demonstrator device concentrated on the area of just a few mm^2, however, poses a real challenge for its testing.

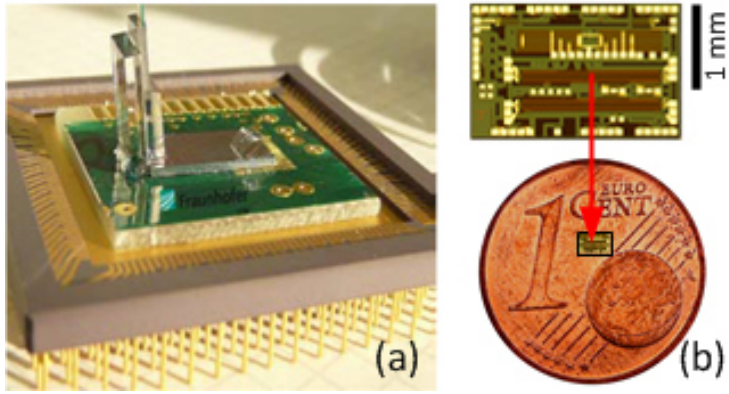

Fig.1: (a) State-of-the-art electro-optical packaging [3]; (b) Silicon photonics demonstrator device with emphasis on its size

Your tasks:

- Modelling and designing of an interposer board for electrical packaging of the device
- Electrical packaging of the device on the interposer board
- Demonstration of fundamental working principles of optical computing by proof-of-concept experiments on the electrically packaged device

[1] P. Ambs, “Optical Computing: A 60-Year Adventure,” Advances in Optical Technologies, vol. 2010, Article ID 372652, 15 pages, 2010, doi:10.1155/2010/372652

[2] D.R. Solli, B. Jalali, “Analog optical computing", *Nature Photonics*, no.9, pp. 704-706, 2015

[3] L. Zimmermann et al., *Packaging and Assembly for Integrated Photonics—A Review of the ePIXpack Photonics Packaging Platform*, J. Sel. Topics Quantum Electron., Vol. 17, No. 3, pp. 645-651, (2011)

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