

Dynamic Broadband Infrared Emitters

Infrared light carries a wealth of information - for example, the material-specific spectral absorption of infrared light can be used to determine the composition and concentration of substances and mixtures. In special cases, compact IR sensors can replace large laboratory measuring devices. This is made possible by miniaturized assemblies manufactured using silicon microsensor technology.

The CiS Research Institute has been working on the development and manufacture of IR emitters for many years. In such chips, the actual active zone is stretched within a very thin membrane. Towards the end of the manufacturing process, the silicon substrate is completely removed in these areas, leaving only a narrow frame for handling and assembly. This structure offers the advantage that the active areas have a very low (thermal) mass and are well thermally insulated from the rest of the system. The assemblies produced in this way are not only very small, with edge lengths in the range of 1 to 3 mm, but also have fast response times. Modulation rates above 100 Hz have already been demonstrated at the CiS Research Institute using very small chips. However, due to the very small active areas, power output is limited, which has so far restricted practical applicability in many scenarios.

The solution to this problem was realized as part of a research project. Technologies were developed and demonstrated that enable an integrated chip with several small active zones. The electrical interconnection is solved directly at the chip level, so that the components can be installed and used in the same way as established light sources. With the first demonstrators of such chips, for example, 3x3 arrays of active zones were realized, which achieve a power output of over 1 W at modulation rates of up to 100 Hz.

The CiS Research Institute focuses on the development and manufacture of innovative silicon components with a high degree of manufacturing maturity. The CiS Research Institute is an important technology partner of Micro-Hybrid Electronic GmbH for the development and manufacture of MEMS IR emitters.

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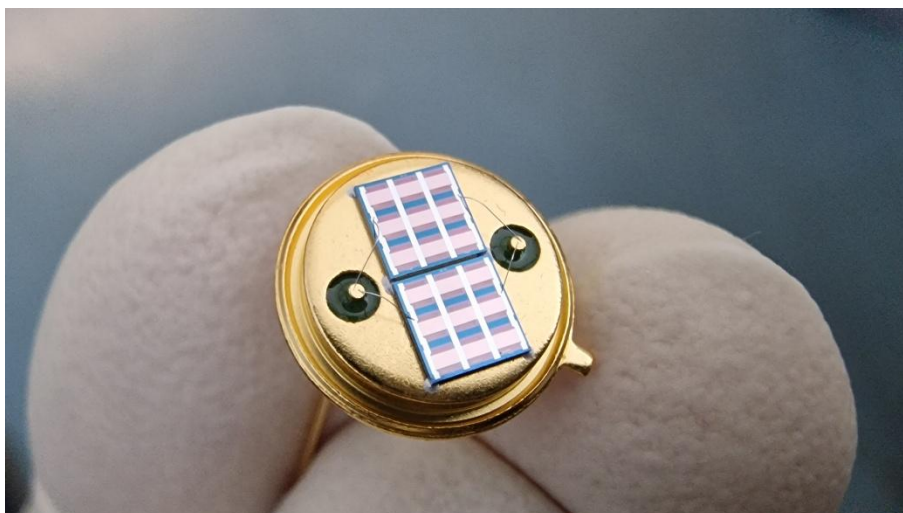


Image 1: Infrared emitter array for thermal radiation between 2 and 15 μm up to 100 Hz. © CiS

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