

Aledia Proposition for Chips Act Initiative

Title: MicroLED Arrays for Optical Interconnects in AI Data Centers

Summary:

To support the development of artificial intelligence, data transfer must be significantly improved in both speed and energy efficiency. Traditional copper interconnects are highly energy-intensive and are approaching their physical and performance limits. While lasers are beginning to be deployed in data centers, they still face challenges related to power consumption and data density.

MicroLED technology presents a promising alternative, with the potential to reduce power consumption by a factor of ten while significantly increasing data transfer density.

As part of the Chips Act 2.0 initiative, we propose the inclusion of a strategic focus on innovative optoelectronic technologies for high-performance computing architectures dedicated to artificial intelligence. Aledia, a European pioneer in 3D MicroLEDs based on nanowires on silicon, aims to develop ultra-fast MicroLED arrays capable of transmitting data optically at very high frequencies between critical components such as GPUs and HBM modules in inter-chip configurations.

This approach seeks to replace or complement traditional electrical interconnects within packages or boards, optimizing bandwidth, latency, and energy efficiency.

Project Objectives:

- Develop addressable MicroLED arrays for optical data transmission in high-performance AI environments.
- Leverage the directional emission and fast modulation capabilities of nanowire-based MicroLEDs to enable low-latency, high-density optical links between GPU and HBM.
- Integrate these arrays into compact photonic modules compatible with chiplet architectures and heterogeneous systems.
- Reduce internal interconnect power consumption through efficient electro-optical conversion at the component level.

Expected Impact:

- Strengthening European technological sovereignty in critical AI infrastructure.
- Establishing a new optoelectronic sector around MicroLEDs for advanced computing architectures.
- Creating synergies with European stakeholders in photonics, advanced packaging, and embedded systems.

**Call for Support:**

We recommend that Chips Act 2.0 include a dedicated axis for optoelectronic technologies for AI, including:

- Funding pilot lines for the fabrication of fast-modulation MicroLED arrays.
- Supporting collaborative projects between chip manufacturers, system integrators, and research institutes.
- Recognizing MicroLEDs as a strategic technology for inter-chip optical communication in AI architectures.