

Energy-and Size-Efficient Ultra-Fast Plasmonic Circuits for  
Neuromorphic Computing Architectures

Consortium

# plasmoni



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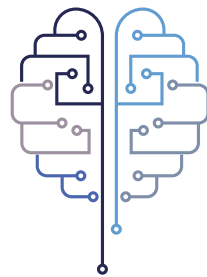
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## PlasmoniAC at a glance



### Objective 1

**Harness plasmonics** for establishing a computationally-credible PIC platform with

- N x100Gb/s bandwidth,
  - $\mu\text{m}^2$ - scale size and
  - $> 10^{14}$  TMAC/s/W computational efficiency
- using CMOS compatible EO & TO photonic computational modules.

### Objective 2

Develop a powerful **3D co-integration platform** merging ultra-fast CMOS plasmonics, low-loss SiN photonics and non-volatile memristors.

### Objective 3

Release a whole **new class** of plasmonic neurons for **feed-forward and recurrent neural networks** with novel photonic activation units.

### Objective 4

Develop a Deep Learning **training suite** with models **tailored to neuromorphic plasmonic circuitry**.

### Objective 5

Showcase intelligent PICs with **time-of-flight latencies for DDoS attack mitigation** in DCIs.

GRANT AGREEMENT

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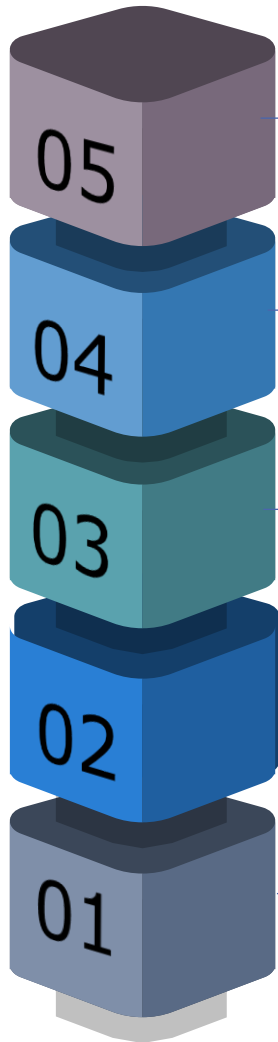
DURATION

01/01/2020 – 31/12/2022

WEBSITE

<http://www.plasmoni.ac.eu>

# Milestones & Technical Progress



## Milestone 5

Noise aware deep learning training models tailored to photonic layouts and capable to counteract inherent hardware limitations.

## Milestone 4

PlasmoniAC linear neuron prototypes using established silicon photonics and plasmonics technologies.

## Milestone 3

SiOC material properties and PVD deposition conditions have been studied and continuously progressing to realize revolutionary TO based weighing technology.

## Milestone 2

Experimental demonstration in bulk using commercial devices for photonic RNNs in various cognitive tasks, serving in this way as pre-cursors of PlasmoniAC prototypes.

## Milestone 1

Specifications identification of plasmoniAC neuromorphic devices and circuits.

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# Dissemination & Communication Activities

Visit our website for more info

The screenshot shows the AMO website header with navigation links: ABOUT AMO, RESEARCH, PRODUCTS & SERVICES. Below the header, the article title is prominently displayed. The text states that AMO is a partner of PlasmoniAC, an EU-funded project aiming to realize a radically new circuit-technology for neuromorphic computing based on plasmons. It mentions that PlasmoniAC responds to industrial needs for high-speed, low-cost, and energy-efficient neuromorphic chips. The article also notes that the kick-off meeting took place on January 21<sup>st</sup>-22<sup>nd</sup>, 2020 in Thessaloniki, Greece.

The screenshot shows the SPIE Photonics West website interface. The main article is titled 'End-to-end deep learning with neuromorphic photonics' by G. Dabos. The abstract describes the emergence of neuromorphic computing as a promising alternative to von-Neuman architectures, highlighting the practical perspectives of the new neural network hardware when synergized with new training frameworks. It mentions the use of 10GHz photonic time series classification engines and the goal of replacing DSP modules in end-to-end fiber transmission schemes.

The Optical Society | Since 1916

The screenshot shows a webinar page for 'Automated PIC Modelling: A Photonic Neural Network Use Case'. It features logos for VPIphotonics and plasmoni. The page includes a diagram of a photonic neural network architecture with various neuron types and activation functions. The text describes the webinar's content, which includes simulation techniques for PICs, group index verification, and the use of VPIComponentMaker software for automated design.

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