

## Semiconductor Nanostructure Systems and Devices:

### III. Nanostructured Metamaterials for Machine Learning.

“Photonic Extreme Learning Machine” (PELM) is the title of a research project founded by MIUR that targets the creation of innovative photonic platforms for the training of feed forward neural networks. One of the platform considered for the creation of PELM exploits metamaterials (hence the name “metaPELM”) based on arrays of semiconductor nanostructures, in particular nanowires.

Within the Thesis projects offered hereby, a prototype of “metaPELM” will be designed, simulated, assembled, demonstrated.

- Nanostructures used in this project will be III-V semiconductor nanowires. (Collaboration with Prof. Lucia Sorba). We also aim at exploring hybrid systems combining nanowires and graphene.
- Additional degree of freedom to control our “metaPELM” will be provided by electrolytes infiltrated into the arrays of nanowires: the electrolyte media can be polymers or gels, or ionic liquids. (Collaboration with Prof. Dario Pisignano).

Main topics of investigation include, but are not limited to:

1. Surface nanopatterning using nanolithography techniques.
2. Epitaxial growth of semiconductor nanowires.
3. Optical measurements in reflection/transmission geometry (collaboration with Prof. Claudio Conti, Sapienza University, Rome).

CONTACT

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