Research Overview of the Laboratory of Semiconductor Materials (LMSC)

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Field of Research: 
Nanostructured Semiconductors for electronics, photonics and optoelectronics

Vertical Nanowires
GaAs on Si
Photodetection

Horizontal Nanowires
Si/Ge on Ge
Quantum Transport

Nanopyramids
Zn$_3$P$_2$ on InP
Photovoltaic

2D Monolayers
MoS$_2$/WSe$_2$
Single Photon Emitters
Field of Research:
Nanostructured Semiconductors for electronics, photonics and optoelectronics

Nanostructures
- Vertical NWs
- Horizontal NWs
- Branched Networks
- Thin Film
- Nanopyramids

Compounds
- III-V
- II-V
- IV
- TMDs

Device
- Photovoltaic
- Photodetection
- Quantum Transport
- Single Photon Emission

Material Design
Structural Analysis
Cleanroom Fabrication
Electrical Characterization
Compound Growth
Advanced Electron Microscopy
Photonic Design
Optical Spectroscopy
1. Zinc-phosphide as an earth abundant absorber in PV
2. Single photon emitters

The morphology and size allow for bright photon emission and high absorption.

GaAs nanowires with a single $\text{Al}_x\text{Ga}_{1-x}\text{As}$ shell

New approach: axial variation of composition

G. Grzela, PhD Thesis (2013), AMOLF

3. Scalable nanowire networks

Wafer scale

$\leq 250$ nm

Through the Y-junction

$I_e \sim 250$ nm

M. Friedl, K. Cerveny, AFiM et al, Nano Lett (2020)
Thank you for your kind attention

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Available TP IV, Semester, Master Projects at LMSC can be found in the webpage epfl.ch/labs/lmsc/