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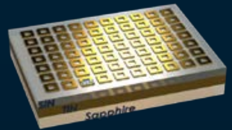
EMPOWERING OPTICAL TECHNOLOGIES WITH REFRACTORY PLASMONIC CERAMICS

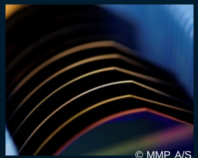
FOCUS

- Nanophotonic functional devices and new physics unlocked by **METAMATERIALS** and **NEW MATERIAL PLATFORMS**
- Interconnects/On-chip optics & optoelectronics
- Data recording/storage / Photodetectors
- Sensors / Bio-medical applications
- Energy conversion

KEY OBJECTIVES



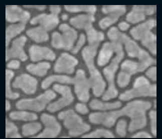
- Exploring **CONSTITUENT MATERIALS** and **DESIGNS** that offer new functionalities
- Enable flat, large-scale, robust, SC-compatible optical devices
  - Active tuning
  - Reduced optical losses
  - Fabrication/integration advantages



CHALLENGES

Plasmonic metamaterial technoligy:

- Large losses in the Vis/NIR
- Lack of tunability/switchability
- Growth, nanopatterning challenges
- Soft, low melting point - Not durable
- High cost - Not CMOS-compatible

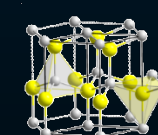


APPROACH

- Utilize **CERAMIC PLASMONIC MATERIALS**: with low loss, tuning/modulation capabilities bio- and CMOS-compatible, high-T stable

APPLICATIONS

- **TRANSPARENT CONDUCTING OXIDES**
- **TTRANSITION METAL NITRIDES**



Refractory materials potential:

- **Bio-med/Photothermal therapy**
- **Heat-assisted magnetic recording (HAMR)**
- **Solar/Thermophotovoltaics (S/TPV)**
- **On-chip optics**