

Ultra-Low-Loss Passive Photonic IC Platform for Sensors

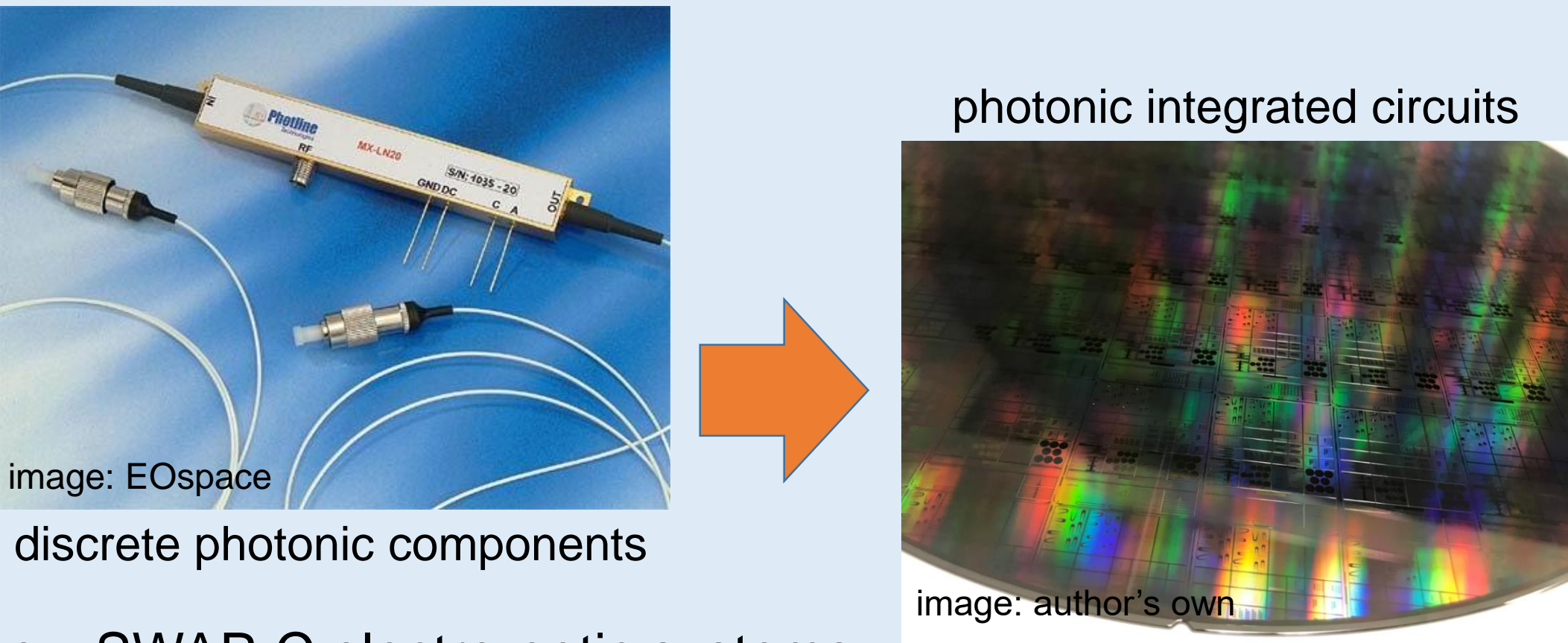
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Ultra-Low-Loss Passive Photonic IC Platform for Sensors [Other: Blank Track]

Background

Photonic Integrated Circuits

- Integration of photonic waveguide components onto single semiconductor die: lasers, modulators, filters, detectors
- Uses similar foundry tools, processes, and materials as electronic ICs
- Low SWAP-C electro-optic systems for commercial and DOD applications



AIM Photonics

- Public-private partnership established by the DOD in 2016 to create US foundry for photonic integrated circuits
- Aims to emulate the dramatic successes experienced by the electronics industry over the past 40 years and transition key lessons, processes, and approaches to the photonic integrated circuit (PIC) industry.



Manufacturing thrusts

- EPDA: Electronic Photonics Design Automation
- MPWA: Multi Project Wafer / Assembly
- ICF: Inline Control & Feedback
- TAP: Test, Assembly & Optical Packaging

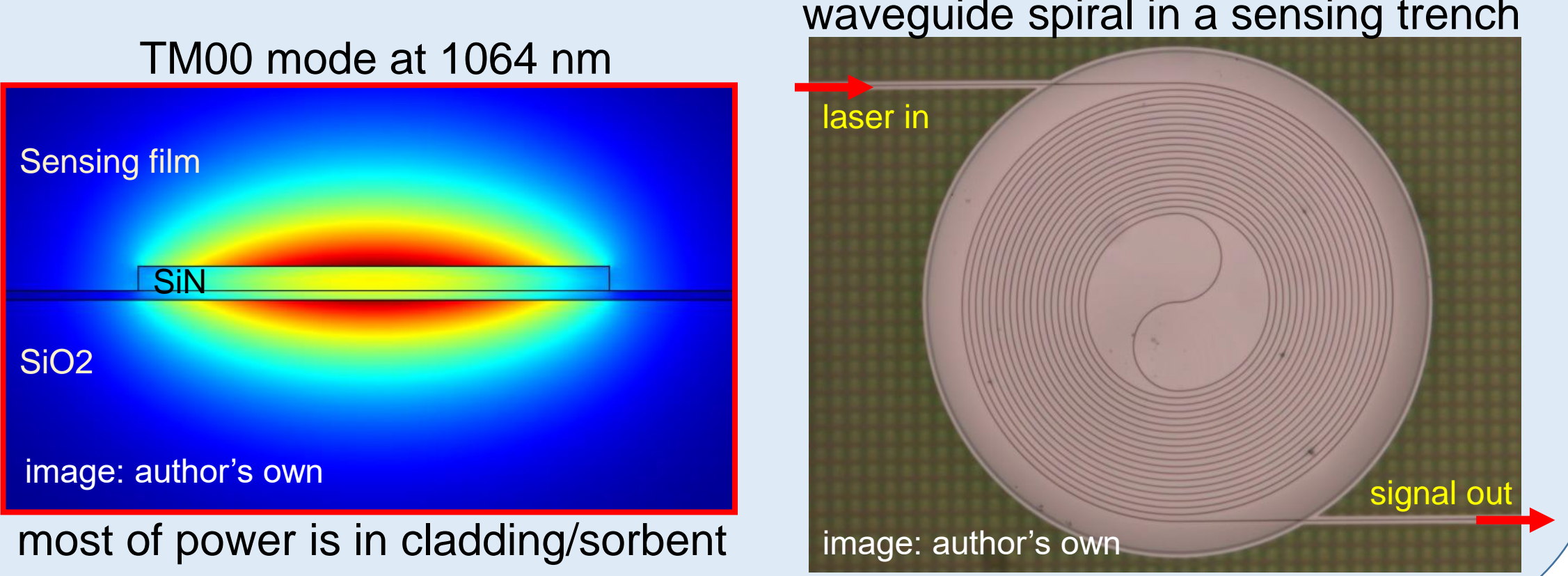
Technology thrusts

- Telecom/Datacom
- RF/Analog
- Sensors
- PIC Array Technologies

Approach

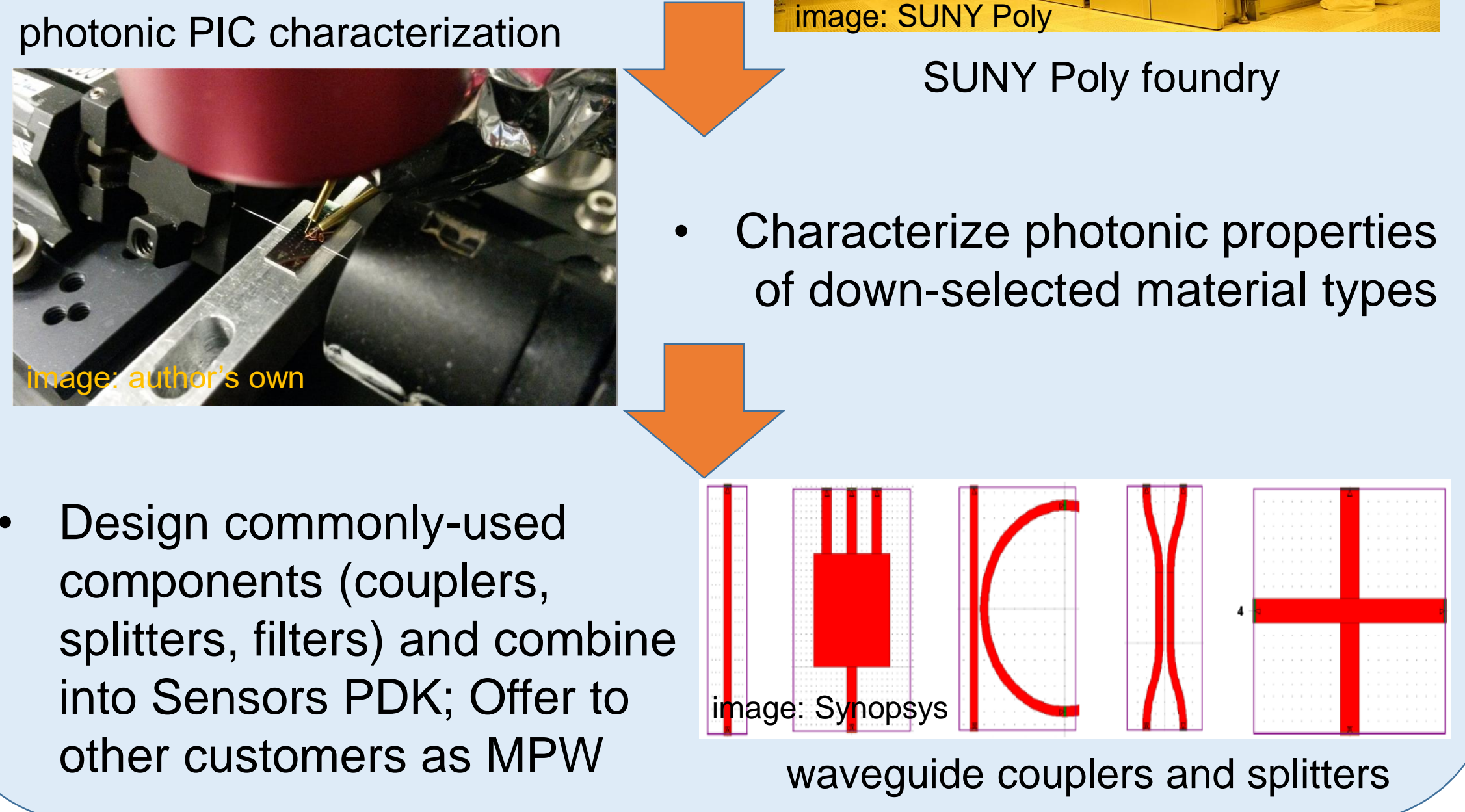
PICs for Sensors vs. Datacomm/Telecomm

- Datacomm/telecomm PICs require
 - O-band and C-band operation (1300 nm → 1600 nm) only
 - TE mode only
 - Active, high-speed components (>GB/s modulators and detectors)
 - Isolation from the environment
 - Waveguide fluorescence is irrelevant
- Sensors PICs require
 - O-band, C-band, plus I/Z/Y/J bands (700 nm → 1600 nm)
 - TE, TM, nanoslot modes
 - Low-loss passive platform (initially)
 - Sensing region for interaction with analytes
 - Ultra-low waveguide fluorescence



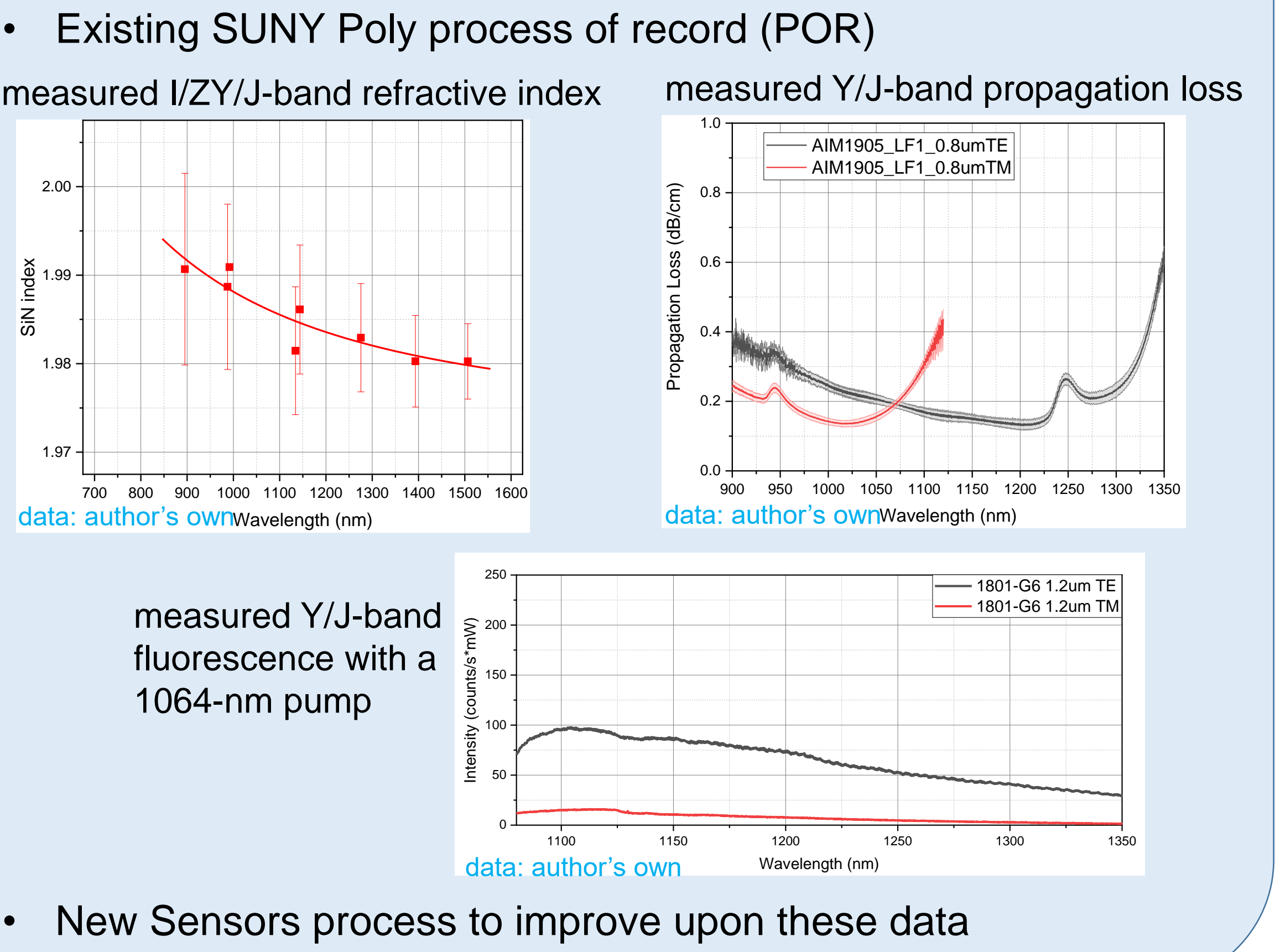
Program Plan

- Identify best combination of materials for waveguide core (SiN type) and cladding (SiO2 type) for Sensors requirements
- Characterize photonic properties of down-selected material types
- Design commonly-used components (couplers, splitters, filters) and combine into Sensors PDK; Offer to other customers as MPW

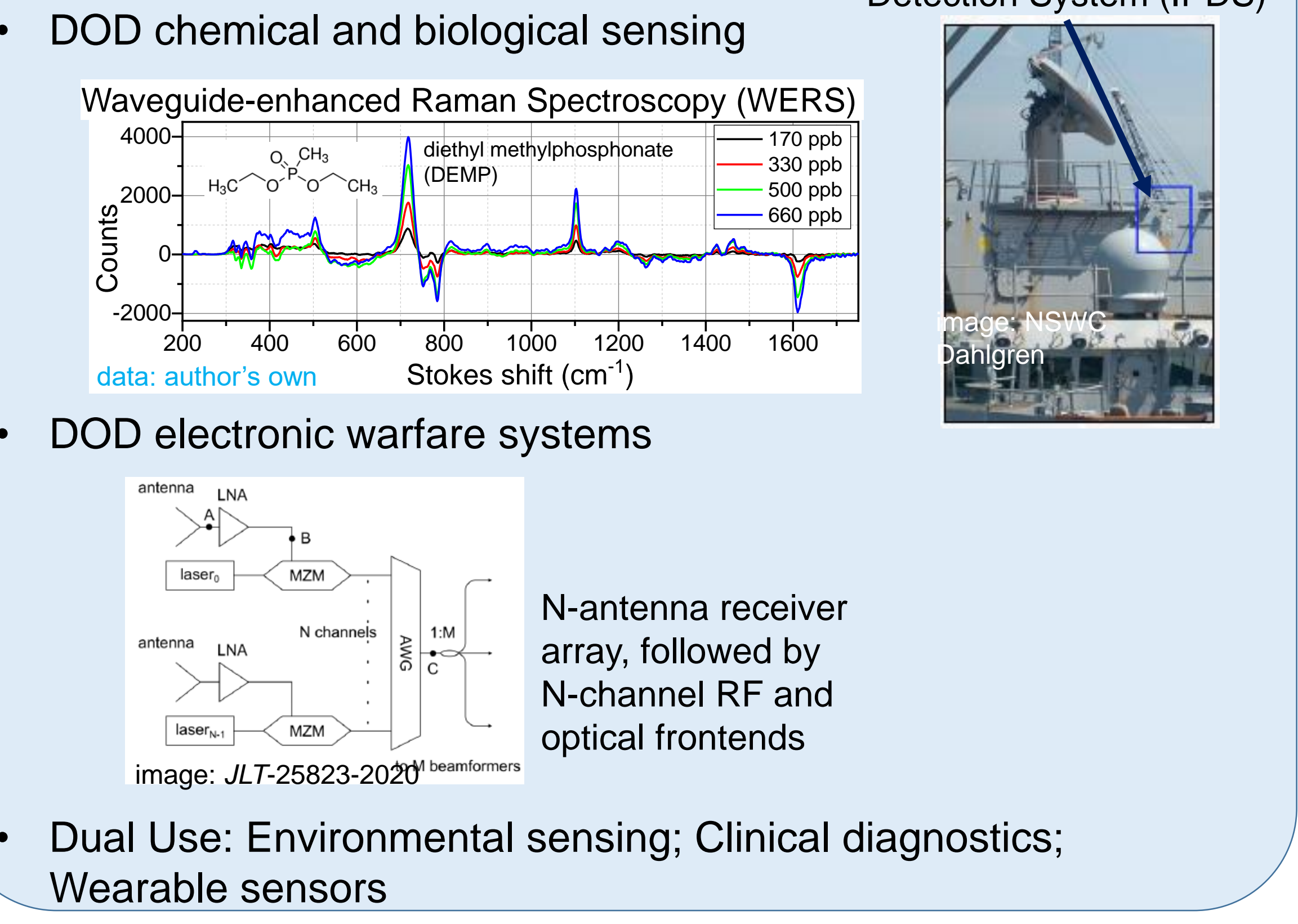


Results and Impact

Benchmarking Existing Platform



Impact



More Information

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