PARC provides customer-focused solutions for developing and commercializing technologies in optics, optoelectronics, and compound semiconductors. We work with clients on projects as basic as adding custom micro-fabrication processes to wafers, to complex development projects involving quantum mechanical engineering at the materials level and complete systems integration.

Our service offerings encompass both optical sensor systems and emitters. These include optical sensor design and prototyping, custom GaN MOCVD growth, heterostructure development, device modeling, materials characterization, and developing integrated systems that incorporate optics, photonics, MEMS, electronics, and fluidics.

By strategically customizing short- or long-term project duration for specific goals and requirements, PARC works with clients at various stages of product development – ranging from proof-of-concept to full system prototype. We combine our deep expertise and extensive infrastructure toward helping clients realize unique designs for devices and systems, conduct analyses using advanced modeling capabilities, and transfer processes to manufacturing.

Our multidisciplinary teams of world-renowned scientists and engineers deliver technology solutions and prototypes that are either ready to commercialize or to showcase your vision to investors, venture capitalists, government, or early customers.

OPTICAL SENSOR DESIGN & PROTOTYPING

Our offerings include developing concepts and prototypes that require system integration based on various technology platforms. Examples of recent projects include portable flow cytometers, wavelength shift detectors, state of charge battery monitors, and continuous glucose monitors.

These applications encompass a wide range of expertise, such as sensors, micro-fluidics, fiber optics, optics, lasers, mechanical engineering, and software.

- Development of sensors for harsh environments (e.g., optical fiber sensors)
- Test and evaluation of customer’s sensors
- Design and development of opto-fluidic systems

Wavelength Shift Detector Concept
GaN MOCVD EPITAXIAL GROWTH

PARC offers custom III-V MOCVD epitaxial growth services, including GaN, AlGaN, and InGaN heterostructures. Sample projects include crystal growths to evaluate novel substrates, LED heterostructure development, evaluation of new MOCVD equipment, gain chips for external cavity light emitters, and development of deep UV LEDs and laser diodes.

**DEVICE CLASSES INCLUDE:**
- Blue and UV LEDs
- Blue-violet lasers
- Semiconductor optical amplifiers
- Photodetectors
- GaN transistors – HEMT
- Novel heterostructures
- Substrate selection – sapphire, GaN, AlN

**HETEROSTRUCTURE EVALUATIONS INCLUDE:**
- X-ray diffraction
- Hall-effect measurement
- Photoluminescence spectroscopy
- AFM
- SEM
- Etched pit density
- Laser diode & LED characterization
- High-current short-pulse electrical testing

III-V WAFFER PROCESSING

- Add-on structures on partially-completed devices
- Full device development
- Prototype fabrication

**EXAMPLES OF PROCESSES:**
Dry etching (CAIBE, ICP); HR/AR optical coating; Dielectric DBR mirrors; ITO contacts to GaAs; GaN; Angled-profile GaN dry etching; AlGaAs lateral oxidation; Laser lift-off substrate removal

DESIGN AND MODELING

- Refractive, reflective, diffractive imaging
- Waveguide design and optimization
- Band structure engineering
- Optical resonant cavities

- Optical, opto-mechanical, thermal system design and analysis
- Lens optimization
- Stray-light analysis

Contact PARC to learn more – engage@parc.com