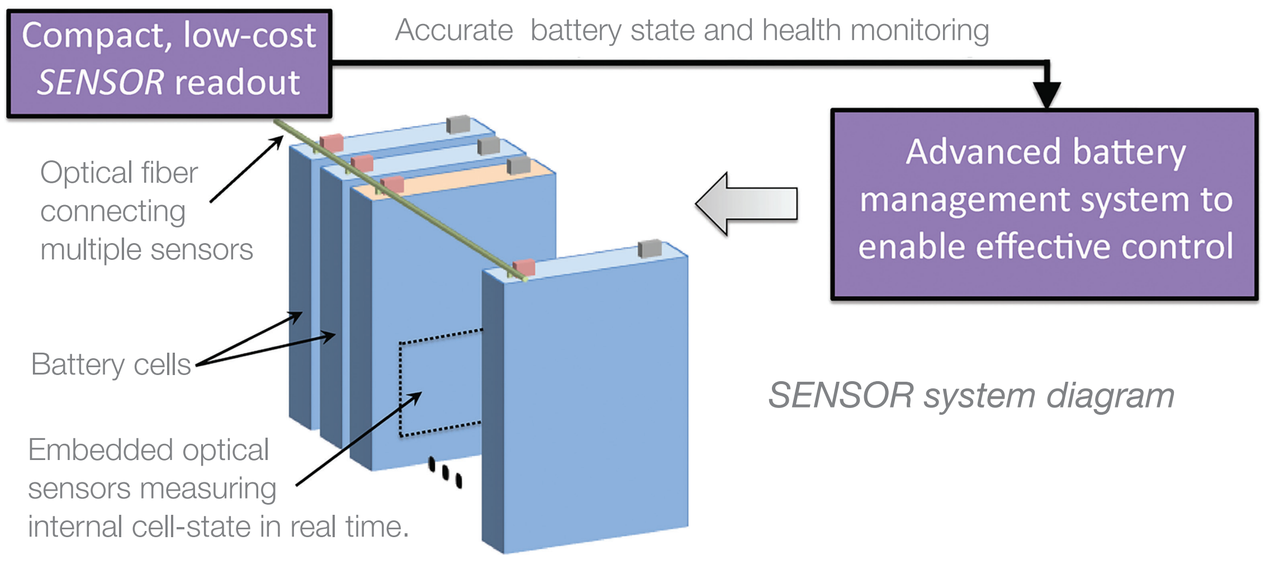
ARPA-E AMPED AWARD

parc®
A Xerox Company

SENSOR

SMART EMBEDDED NETWORK OF SENSORS WITH OPTICAL READOUT

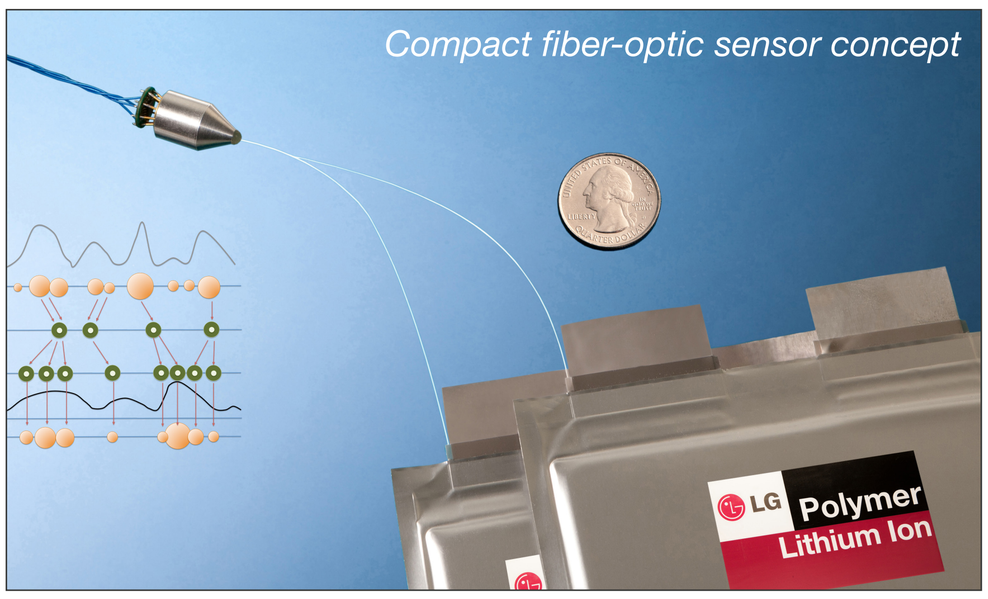


SENSOR system diagram

Real-time direct sensing of a battery's internal conditions

BENEFITS:

- Provides accurate measurement of a battery's State of Charge (SoC) and State of Health (SoH)
- Mitigates oversizing and over-engineering of battery packs
- Improves operational safety
- Hair-thin, lightweight fiber-optic (FO) sensors are embedded into each cell to directly measure SoC and SoH parameters.

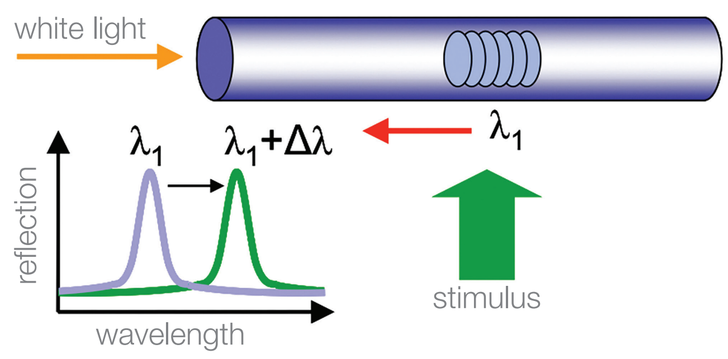


- A compact, field-deployable, low-cost readout unit makes monitoring multiple FO sensors economically viable for fielded batteries, and PARC's smart algorithms translate these signals into accurate state estimates to enhance pack performance.
- This solution is broadly applicable to many other fielded energy systems with similar monitoring and control challenges.

TECHNOLOGY ENABLERS:

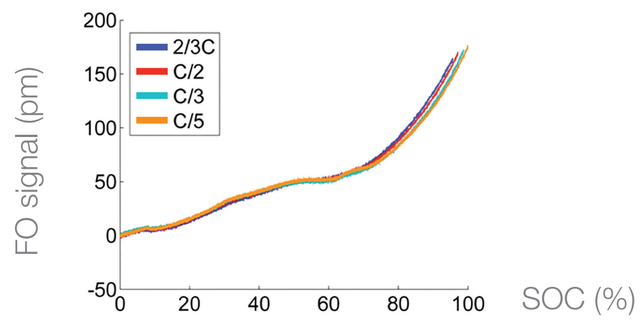
EMBEDDED FIBER OPTIC SENSORS

- EV-grade FO-embedded cells fabricated
- Measurable parameters include temperature, strain and pressure, and chemical composition



NOVEL OPTICAL SENSING READOUT

- Resolves wavelength shifts down to 30 fm
- Monitors high frequency signals up to 10 kHz
- Can handle up to 1000 multiplexed sensors



SMART BMS ALGORITHMS

- SoC accuracy down to 2.5% using FO signals
- Accurate SoH, SoP estimation also feasible
- Initial cost-performance models indicate feasibility for 10-12% pack cost and up to 20 lbs. pack weight savings.

Contact PARC to learn more: **engage@parc.com**