# LICENSING OPPORTUNITY

NIST NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY U.S. DEPARTMENT OF COMMERCE

# PHOTONIC CALORIMETER

Ref. 17-025

## THE TECHNOLOGY

**U.S. Patent Number 10,782,421**

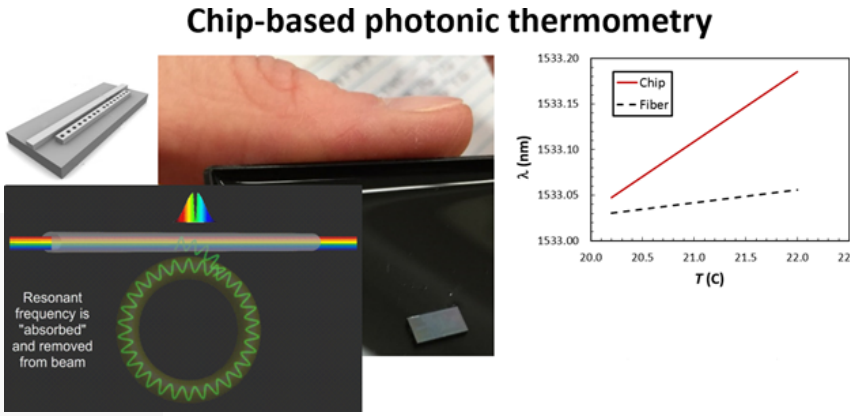
The calorimeter uses embedded, nanofabricated photonic sensor arrays to enable micrometer-scale spatial resolution of dose (energy) distribution and gradients. It replaces thermistors (used in conventional radiation calorimeters) with photonic sensors of various designs embedded in numerous possible materials (such as graphite, diamond, water, human tissue, silicon, etc.) for in-situ dose and dose-gradient measurements.

**INEXPENSIVE**

**SMALL SCALE MEASUREMENT**

**IDEAL FOR CELLULAR DOSIMETERY**

These new devices will have much higher spatial resolution, lower self-heating, reduced artifacts at sensor-absorber interfaces, and capability for imaging using arrays of sensors on a chip (2D) and arrays of chips (3D). Improves capability to measure dose and dose gradients (near beam penumbrae and near surfaces or material boundaries) for measuring energy deposition from beams (photon, electron, etc.) with low penetration depth.




*An in-situ nano-scale dosimetry and calorimetry leading to new chip-based metrology for industrial and medical applications. Increased sensitivity, spatial resolution, optical readout and multiplexing capabilities could redefine the meaning of "dose", reduce dependence on Co-60 sources, enable new portable sensors, and help close the loop on quantitative nuclear medicine.*

*Graph shows linear curves using slopes measured at NIST for Fiber Bragg Gratings and Photonic Ring Resonators on a Chip.*

## BENEFITS

Leverages inexpensive commercial communications technology and chip fabrication for inexpensive manufacturing and operation.

Technically superior by enabling absolute dosimetry at an unprecedented physical scale due to micron-scale spatial resolution across six orders-of-magnitude of absorbed dose, from medical diagnostic and therapeutic procedures up through industrial materials processing, sterilization, and applications leading to commercialization of space.

## CONTACT

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