A new fluorescence cell has been developed for the laser induced fluorescence (LIF) detection of formaldehyde. The cell is used to sample a flow of air that contains trace concentrations of formaldehyde. The cell provides a hermetically sealed volume in which a flow of air containing formaldehyde can be illuminated by a laser. The cell includes the optics for transmitting the laser beam that is used to excite the formaldehyde and for collecting the resulting fluorescence. The novelty of the cell is its optical design, which allows for a high collection efficiency and decreased stray light.

The overall performance of the cell is comparable to the performance of a White-type multipass cell that has 32 passes. The size of the new cell is half the size of a White cell with comparable sensitivity. All components are either off-the-shelf or standard products. No custom optics were used in this design. Most importantly, the cell is extremely simple to adjust or align, and once aligned, it is insensitive to thermal and mechanical distortions.

This work was done by Matt Leftwich, Tony Hull, Michael Leary, and Marcus Leftwich of Space Photonics, Inc. for Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-16441-1

Towed Subsurface Optical Communications Buoy

NASA’s Jet Propulsion Laboratory, Pasadena, California

The innovation allows critical, high-bandwidth submarine communications at speed and depth. This reported innovation is a subsurface optical communications buoy, with active neutral buoyancy and streamlined flow surface veins for depth control. This novel sub-surface positioning for the towed communications buoy enables substantial reduction in water-absorption and increased optical transmission by eliminating the intervening water absorption and dispersion, as well as by reducing or eliminating the beam spread and the pulse spreading that is associated with submarine-launched optical beams.

This work was done by Robert C. Stirbl and William H. Farr of Caltech for NASA’s Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov. NPO-47737

High-Collection-Efficiency Fluorescence Detection Cell

A relatively compact and economical unit is used for the detection of formaldehyde.

Goddard Space Flight Center, Greenbelt, Maryland

with custom laser diode and photodiode manufacturers, total power requirements of the complete four-channel, 2.0-Gbps FireRing products are less than 1.5 Watts. Similar results are anticipated from the proposed 3.2-Gbps development effort. Additional packaging innovations as alternatives to costly hermetic sealing, passive integration, and heat dissipation will also compliment this aspect of the proposed effort.

The ultimate goal of this project will be the successful design, fabrication, and demonstration of a rad-hard, single-channel, 3.2-Gbps serial fiber-optic transceiver that is universally compatible with virtually all protocols and architectures that interest NASA and the DoD. Key functional attributes and/or improvements beyond the current state of the art in harsh-environment fiber-optic networking components are improved thermal stability, reduced power dissipation, reduced size and mass, special-purpose data processing, reconfigurable computing, protocol-transparent/multi-protocol-compatible, subsystem data transfer, intra-system data transfer, data system support, and proven materials, fabrication, and packaging processes.

This work was done by Leftwich and Hull for Space Photonics, Inc. for Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-16433-1

Towed Subsurface Optical Communications Buoy

NASA’s Jet Propulsion Laboratory, Pasadena, California

The innovation allows critical, high-bandwidth submarine communications at speed and depth. This reported innovation is a subsurface optical communications buoy, with active neutral buoyancy and streamlined flow surface veins for depth control. This novel sub-surface positioning for the towed communications buoy enables substantial reduction in water-absorption and increased optical transmission by eliminating the intervening water absorption and dispersion, as well as by reducing or eliminating the beam spread and the pulse spreading that is associated with submarine-launched optical beams.

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This work was done by Thomas Hanisco and Maria Cazorla of Goddard Space Flight Center, and Andrew Swanson of the University of Maryland, Baltimore County. Further information is contained in a TSP (see page 1). GSC-16433-1