could be adapted to support a wide variety of harsh environments. As such, the RICS could be a useful instrument outside the scope of a nuclear reactor, including military applications where fail-safe data acquisition and control is required with stringent size, weight, and power constraints.

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Inquiries concerning rights for the commercial use of this invention should be addressed to NASA Glenn Research Center, Innovative Partnerships Office, Attn: Steven Fedor, Mail Stop 4–8, 21000 Brookpark Road, Cleveland, Ohio 44135. Refer to LEW-19014-1.

High-Power, High-Speed Electro-Optic Pockels Cell Modulator

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Electro-optic modulators rely on a change in the index of refraction for the optical wave as a function of an applied voltage. The corresponding change in index acts to delay the wavefront in the waveguide. The goal of this work was to develop a high-speed, high-power waveguide-based modulator (phase and amplitude) and investigate its use as a pulse slicer. The key innovation in this effort is the use of potassium titanyl phosphate (KTP) waveguides, making the high-power, polarization-based waveguide amplitude modulator possible. Furthermore, because it is fabricated in KTP, the waveguide component will withstand high optical power and have a significantly higher RF modulation figure of merit (FOM) relative to lithium niobate. KTP waveguides support high-power TE and TM modes — a necessary requirement for polarization-based modulation as with a Pockels cell.

High-power fiber laser development has greatly outpaced fiber-based modulators in terms of its maturity and specifications. The demand for high-performance nonlinear optical (NLO) devices in terms of power handling, efficiency, bandwidth, and useful wavelength range has driven the development of bulk NLO options, which are limited in their bandwidth, as well as waveguide based LN modulators, which are limited by their low optical damage threshold.

Today, commercially available lithium niobate (LN) modulators are used for laser formatting; however, because of photorefractive damage that can reduce transmission and increase requirements on bias control, LN modulators cannot be used with powers over several mW, dependent on wavelength.

The high-power, high-speed modulators proposed for development under this effort will enable advancements in several exciting fields including lidar-based remote sensing, atomic interferometry, free-space laser communications, and others.

This work was done by Justin Hawthorne and Philip Battle of AdvR, Inc. for Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-16559-1