Advanced Halide Optical Fibers for In-Space Manufacturing

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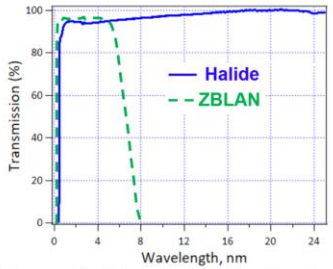
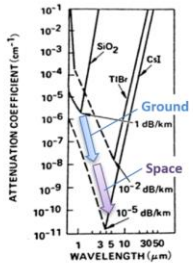
Opportunity: Reaching Beyond ZBLAN

Superior IR Spectral Bandwidth: up to **3x Cutoff Wavelength**

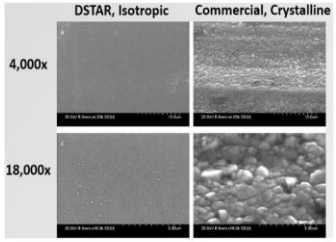


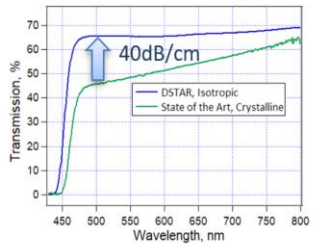
Predicted, up to **100x Lower Loss**



Advanced halide materials, like silver halides, offer superior spectral bandwidth and significantly lower predicted insertion loss compared to even ZBLAN fibers.
P. Klocek, G. Sigel, "Infrared Fiber Optics", Vol TT2, 1989.

Feasibility: Ground Modelling of Microgravity



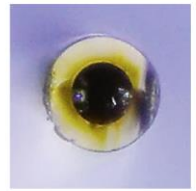


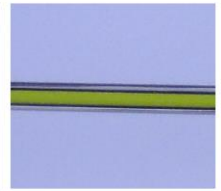
Enhanced microscopic structure demonstrates significantly lower insertion loss.
Ground testing reveals considerable improvement compared to the current state of the art.

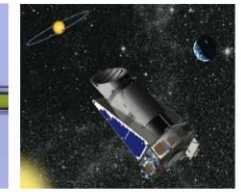
DSTAR Communications development is covered by these and other patent-pending applications:

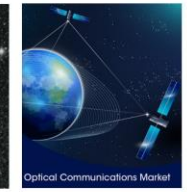
US Patent Application 20240174546, "Microgravity crucible-controlled manufacturing"
US Patent Application 66094203, "High density interconnects with 3D broadband electrooptic components"
US Patent Application 038602 "Glass parts and infrared fiber preform manufacturing in microgravity"
US Patent Application 624,633, "Optical elements, devices and systems comprising halide material compositions solidified from melts"

Commercial Opportunity: New Infrared Fibers





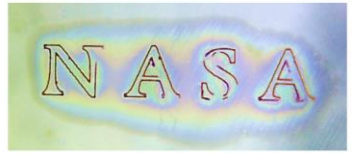


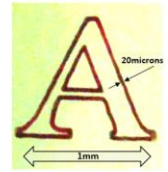


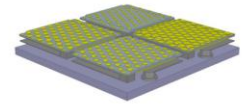
To our knowledge, DSTAR was the first to demonstrate the patent-pending molten-core halide optical fiber during ground simulations of microgravity processing conditions.

SPIE OP24O, paper 13140-16: https://spie.org/OPO/conferencedetails/photonic-fiber-crystal-devices
NASA exoplanet search application: https://link.springer.com/article/10.1007/s10686-008-9121-x
Optical Communication and Networking, CAGR 8.6%, $48.8B in 2032:
https://www.sphericalinsights.com/reports/optical-communication-and-networking-market

Commercial Opportunity: New Hybrid Photonic Chips







Patent-pending processing by DSTAR Communications yields plasmonic quantum dot metamaterials for high-density, 3D photonic components and interconnects.

New metamaterials enable multispectral infrared imagers in molecular fingerprint region (8-14 microns) for environmental monitoring and greenhouse gas analysis.

Potential platforms include helmet-mounted sights, unmanned aerial vehicles, robots, and driver's aids for commercial and military vehicles.

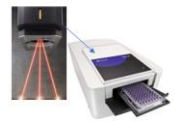
https://engineering.missouri.edu/2021/grant-from-the-army-research-office-enables-new-generation-of-multispectral-infrared-imagers/

OLaF™: Orbital Laser Foundry

OLaF1 Alpha

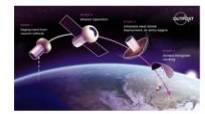
Feasibility demo for laser material processing on the ISS

OLaF2 Beta



High-throughput Laser Discovery Assay Reader on ISS

OLaF3 Foundry



Automated External ISS Payloads, Commercial Stations and Free Flyer Research Platforms

DSTAR Communications' patent-pending laser-assisted microgravity research and processing of new materials hold significant commercial potential for microgravity exploration and in-space manufacturing. Mission feasibility is assured by leveraging a flight-tested, modular ISS platform.

This work is supported by NASA SBIR Contract 80NSSC23CA092.

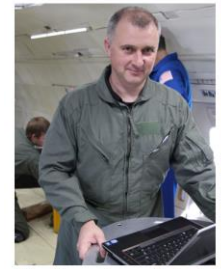
$100B Opportunity: Photonic Chips

The hybrid photonic chip market is ***rapidly expanding with 20% CAGR*** due to the rise of data-driven ecosystems and increasing AI-driven demand:
https://www.mordorintelligence.com/industry-reports/hybrid-photonic-integrated-circuit-market
https://www.custommarketinsights.com/report/semiconductor-photonic-integrated-circuits-market/
Satellite internet market is ***growing with 30% CAGR*** due to rapid transition from wired connections:
https://www.acumenresearchandconsulting.com/satellite-internet-market

Hybrid photonic chips are poised to integrate optic transmission with next-generation AI and space platforms.

Prior Work

First Microgravity Fiber on a Parabolic Flight



First Orbital ZBLAN Delivery to NASA

Successful ZBLAN Commercialization (Licensed to Flawless Photonics, Inc.)

https://opg.optica.org/abstract.cfm?uri=aio-2014-AM4A.2
https://www.thefoa.org/foanl-10-19.html#more
https://www.issnationallab.org/2019-issrdc-award-demonstration-of-patented-hardware-for-in-space-manufacture-of-zblan-fibers/
https://space-agency.public.lu/en/news-media/news/2024/flawless-photonics-pioneering-space-fiber-luxembourg.html

Thank you!

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For additional information please visit us at:
https://dstarcom.com/

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