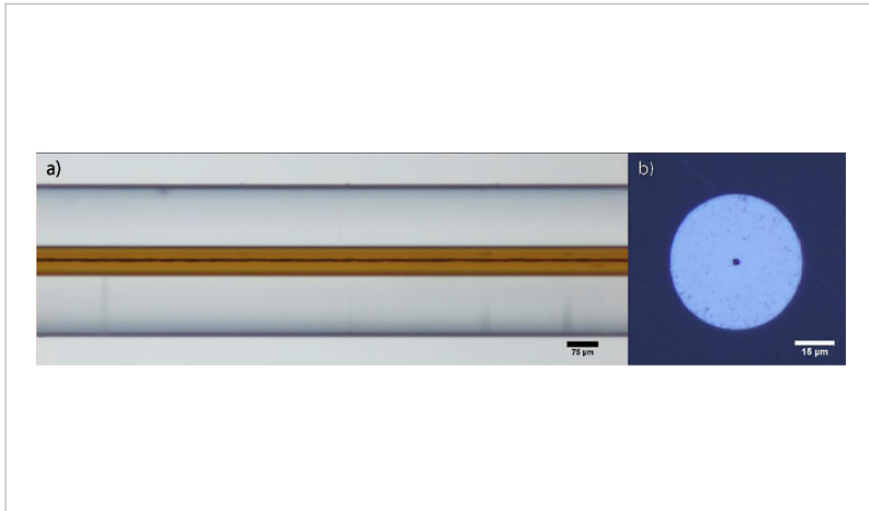


# Transition Metal Doped II-VI Semiconductor Optical Fibers

ID# 2016-4467



PennState



Axial/Radial Graphs of Cr<sup>2+</sup>:ZnSe Fibers

## Technology Summary

Inventors have developed novel compositions of, and methods to produce, transition metal doped II-VI semiconductor optical fibers. These fibers have many attractive characteristics, including high efficiency, and exceptional tunability of laser properties. By changing the transition metal or host material, the emission wavelength tuned over much of the mid-Infrared (IR). High pressure chemical vapor deposition (HPCVD) allows for a uniform doping concentration along centimeter length scales, overcoming significant technological disadvantage to current doping schemes. Using HPCVD, the inventors created Chromium doped Zinc Selenide (Cr<sup>2+</sup>:ZnSe) optical fiber. Inventors have demonstrated that Cr<sup>2+</sup>:ZnSe optical fibers guide high powers of infrared light, suggesting they hold promise for applications such as non-linear frequency conversion and high power fiber lasers.

## Application & Market Utility

Transition metal doped II-VI semiconductors have transmission windows that extend into the IR making them very useful for applications such as chemical and thermal sensing, infrared countermeasures, stand-off detection of explosives, & nonlinear optics. As an example, Cr<sup>2+</sup>:ZnSe is the only known gain medium to function with a high quantum efficiency in the important wavelength region from 2 to 4 microns. An Cr<sup>2+</sup>:ZnSe optical fiber may allow for ultrafast applications & be used in chemical detection, biomedicine, infrared countermeasures, and astronomical applications.

## Next Steps

Seeking research collaboration and licensing opportunities.

TECHNOLOGY READINESS LEVEL

1-3

### Seeking

Investment | Licensing | Research

### Keywords

- Optical Fiber
- Infrared Laser
- US Patent No. 10,527,783

### Researchers

#### John Badding, Ph.D.

Professor of Chemistry, Physics and Materials Science and Engineering

#### Justin Sparks, Ph.D.

### Office of Technology Management Contact

Smith, Matthew  
mds126@psu.edu  
814-863-1122



Invent Penn State is a Commonwealth-wide initiative to spur economic development, job creation, and student career success. Invent Penn State blends entrepreneurship-focused academic programs, business startup training and incubation, funding for commercialization, and university-community collaborations to facilitate the challenging process of turning research discoveries into valuable products and services that can benefit Pennsylvanians and humankind. Learn more at [invent.psu.edu](http://invent.psu.edu).

Penn State is an equal opportunity, affirmative action employer, and is committed to providing employment opportunities to all qualified applicants without regard to race, color, religion, age, sex, sexual orientation, gender identity, national origin, disability or protected veteran status.