

April 2016

## Patent Spotlight: Researchers Develop a First-of-its-kind Laser

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### Recommended Citation

Staff, News and Communications Services (2016) "Patent Spotlight: Researchers Develop a First-of-its-kind Laser," *Seek*: Vol. 6: Iss. 1.

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*Patented laser technology by Kansas State University researchers could be used to transmit information or high optical power through the Earth's atmosphere or to sense harmful agents in the atmosphere.*

## Researchers develop a first-of-its-kind laser



Consider this now patented discovery in the field of physics an illuminating one.

In 2011, Kristan Corwin and Brian Washburn, associate professors of physics, along with Andrew Jones and Rajesh Kadel, both Kansas State University physics graduates now working as industry research scientists, began developing a new kind of laser — one that is fiber-based and uses various molecular gases to produce light at difficult-to-reach wavelengths.

“Because it’s a fiber laser technology, it may ultimately prove to be very portable,” Corwin said. “Also, because it’s based on a gas-lasing medium, it’s inexpensive to produce.”

Kansas State University researchers in

collaboration with the University of New Mexico designed the laser technology from a hollow-core photonic crystal fiber that is about half the width of a human hair. This optical fiber is filled with a molecular gas, such as hydrogen cyanide or acetylene. The gas is excited with another laser, causing a molecule of the excited gas to spontaneously emit light. Other molecules in the gas quickly follow suit, resulting in light.

“The technology that led to this is remarkable,” Corwin said. “The complex structures in the micro-structured optical fiber we use are micron-sized and uniform down many meters of fiber. By using the hollow fiber, we can have very high intensities of light even with relatively low

powers. This reduces the lasing threshold with respect to free-space traditional systems and makes more portable applications accessible.”

This lack of traditional systems makes the lasers a viable candidate for new communications and sensing technologies, Corwin said. Possible uses include transmitting information or high optical power through the Earth’s atmosphere as well as sensing harmful agents in the atmosphere.

The laser received U.S. patent No. 9,106,055 in August 2015.

Since its patent, recent breakthroughs in fiber design and fabrication by collaborators in Limoges, France, have made the lasers more efficient in emitting light.