Explain It: How Scientists Sniff Out What's in a Smell

Kadri Koppel
Kansas State University

Follow this and additional works at: https://newprairiepress.org/seek

Part of the Higher Education Commons

This work is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 4.0 License.

Recommended Citation

This Article is brought to you for free and open access by New Prairie Press. It has been accepted for inclusion in Seek by an authorized administrator of New Prairie Press. For more information, please contact cads@k-state.edu.
Koppel: Explain It: How Scientists Sniff Out What’s in a Smell

In food and other product analysis, understanding the composition of aroma is often important. A gas chromatograph is an analytic instrument that enables measurement of aromatic volatile compounds. To measure what the aroma consists of, we need to capture the aroma compounds and inject those in the gas chromatograph’s column. The compounds are separated out with a carrier gas pushed through the column. A detector in the end of the column helps us identify the aromatic compounds, thus helping us understand what causes our sample to smell the way it does.

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 micro-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.

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 micro-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.

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 micro-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.

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 micro-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.

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 micro-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.