

of Physicists

Canadian Association Association canadienne des physiciens et physiciennes

Contribution ID: 1843

Type: Invited Speaker / Conférencier invité

Application of lasers in gas and chemical sensing

Monday 29 May 2017 14:00 (30 minutes)

Fiber lasers have many applications in industry and medicine because of their unique characteristics—an allfiber design, compact size, cost-effective production and operation, and no need for re-alignment and external cooling. A fiber laser emitting in the infrared region has applications in optical communication, sensing, spectroscopy and nonlinear optics.

The Photonics Research Group is currently developing (i) A sensor to detect trace gases—a stand-alone gas analyzer, for real-time use at ambient temperature, to monitor N2O emissions was developed; research in tracegas sensing, especially detecting and quantifying greenhouse gases, is growing rapidly; and (ii) A plasmonic nanostructure to detect chemicals at a molecular level using fiber laser technology-using optical tweezing to trap dielectric particles revolutionized research in nanotechnology and spectroscopy. An optical tweezer based on a single-mode or a multimode tapered fiber is attractive because it is simple to fabricate. A plasmonic substrate was fabricated using gold nanorods (GNR). The GNRs were tweezed by the gradient force on the surface of the tapered fiber. The gradient force was produced by the laser light coupled to the fiber from the untapered end. The GNRs formed a periodic structure like a fiber Bragg grating.

In this talk, the author will present details of the gas detection system and its unique features, and discuss the fabrication of plasmonic structures on a tapered optical fiber using optical tweezing.

This work was supported by Natural Sciences and Engineering Research Council of Canada (NSERC), Canada Foundation for Innovation (CFI) and Agrium Inc.

Author: Dr DAS, Gautam (Lakehead University)

Presenter: Dr DAS, Gautam (Lakehead University)

Session Classification: M3-2 Photonics: Devices (DAMOPC/DCMMP) | Photonique: dispositifs (DPAMPC/DPMCM)

Track Classification: Division of Atomic, Molecular and Optical Physics, Canada / Division de la physique atomique, moléculaire et photonique, Canada (DAMOPC-DPAMPC)