

**VERTIGAN**

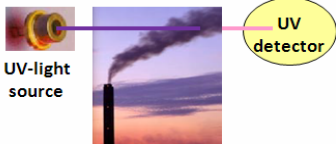
(Vertical Cavity emitters based-on GaN for optical fiber sensors)

C3S (Centrale Supélec Sciences des Systèmes)

IAF (Fraunhofer Institut Angewandte Festkörperphysik)

Starting date: 09 - 2009

Name of the authors: F. Genty (coord.), M. Kunzer, J. Wagner, J. Jacquet,

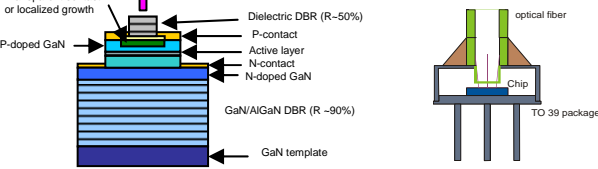


For a healthier world ...

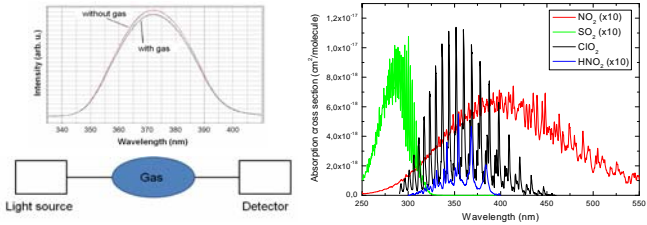
**Objectives of the project and challenges**

One of the major challenges in environmental control is the monitoring of air and water quality. This requires highly selective, sensitive, fast, and low-cost sensors for efficient pollution monitoring. Many pollutants exhibit strong absorption lines in the Ultra-Violet (UV) spectral range which allows spectroscopic optical techniques to be used for rapid, sensitive and contactless gas sensing. Fiber-coupled optical spectroscopy sensors offers a range of significant advantages over other concepts such as high selectivity and specificity, high sampling rate, real-time, on-line monitoring but also compactness, robustness, inertness and

multiplexing capabilities.



GaN-based RC-LED and schematized fiber-coupling



Principle of absorption spectroscopy and absorption lines of pollutants in UV range

In this project, we develop a practical electrically-injected RC-LED emitting in the 380-400 nm range built on a epitaxially grown AlGaIn/GaN DBR underneath an active GaInN/GaN MQW active region. Owing to its vertical geometry, such a device is particularly well-adapted for fiber-coupling and will thus naturally be preferred as a light source of choice place for the development of new gas sensors by optical spectroscopy.

**Creating long-term French-German strategic alliances**

VERTIGAN will contribute to a closer collaboration between institut Carnot and FhG by establishing a strong research link in the field of optoelectronics between the institut Carnot C3S in Metz Supélec campus (F) and the Fraunhofer IAF in Freiburg (D). The results of VERTIGAN will be the basis for further future collaborations. This project will contribute to the sustainable development of both research institutes. At Fraunhofer IAF, a new business unit "micro- and nano-sensors" has been established in 2008 to which this project will make a significant contribution. Moreover, most leading European companies developing Nitride-based LEDs and optical sensors are located in France and Germany, which will further reinforce the collaboration between these two countries in this high technology area.

**Expected results and market opportunities**

The principal progress resulting from this project would be to make available, for industrial and university end-users, a handy, reliable and low cost GaN-based UV light source perfectly matched for spectroscopy. A product which addresses the emerging and rapidly growing Nitride-based LED market (the worldwide revenues for 2007 were 3500 Mio€ with an annual growth rate of 18 percent). Moreover, VERTIGAN seeks to investigate real advanced LED products, which implies the creation of skilled employment opportunities in worldwide competitive sectors of European industry. The delivery of a prototype fiber coupled RC-LED module, suitable for practical use, will allow potential industrial users, e.g. in particular Sick AG, Dräger, IL Metronic, Siemens, to asses this technology with minimum time delay.

