



A perfect combination of old and new

Vaisala CARBOCAP® carbon dioxide measurement technology celebrates ten years in business

Nondispersive Infrared (NDIR) gas sensing has been recognized as one of the most powerful tools for gas analysis for decades. Over time, advances have been made in NDIR gas sensing devices: infrared light sources, infrared filters, sensor optics and sensing algorithms to name but a few. Seldom, however, has there been such a profoundly new and innovative method introduced to NDIR gas sensing as when the Vaisala CARBOCAP® carbon dioxide sensor was introduced in 1997. As great inventions often are, it was a combination of the tried and trusted with something totally new – combining NDIR gas sensing and hundred-year-old optical principles with silicon micromechanics.

In 1897, exactly one hundred years before CARBOCAP® was invented, French physicists Charles Fabry and Alfred Pérot

published their most important article on what we today call the Fabry-Perot Interferometer (FPI). Based on the interference of light reflecting back and forth between two mirror surfaces, the device acts as a bandpass filter permitting only a certain wavelength of light to pass through it. The first devices were large, weighed several tens of kilos, and were used for accurate determination of lengths and wavelengths.

From drawing boards to product launch

The first ideas on silicon micromachined optical filters were discussed at Vaisala already in the very early 1990's. "First we were thinking of an optical pressure sensor with a remote readout using fibre optics," recalls Ari Lehto, one of the technology pioneers and key figures behind the CARBOCAP® technology, now the Professor of silicon technology at the Helsinki University of Technology.

The technical ideas were combined with the business intent of entering the gas measurements market with proprietary technology, and the project gained direction and momentum. Finally in 1997, after several years of intense technology development and countless cycles of trial and error, the first CARBOCAP® products

were launched. Christer Helenelund, Product Line Manager for CARBOCAP® products for eight years, looks back at the hectic moments before the launch: "At one point before the launch we observed some stability problems and identified altogether 12 possible sources for drift that had to be analyzed. It later turned out that not one of them was the correct one!"

A good product keeps getting better

The sensor structure has evolved and improved significantly from those days, but the Vaisala CARBOCAP® Carbon Dioxide Transmitter GMD/W20 products that were then launched are still going strong and proving their robustness and stability in HVAC installations around the world. In ten years, the CARBOCAP® product family has grown towards more and more demanding applications. Today the CARBOCAP® technology is known as the state-of-the-art NDIR technology in a wealth of CO₂ measurement applications ranging from pharmaceutical CO₂ incubators to ecological carbon cycle research.

We wish the lively ten-year-old all the best on its way to growing into an energetic teenager! ■

