

# Trace-level H<sub>2</sub>O and CO analyzer for impurities measurement in industrial applications

Lei Tao<sup>1,2</sup>, Howard Bell<sup>2</sup>, Josh Collins<sup>2</sup>, Mark Zondlo<sup>1,3</sup>

<sup>1</sup>MIRTHE<sup>+</sup> Photonics Sensing Center, Princeton University

<sup>2</sup>Intelligent Material Solution, Inc. Princeton, NJ

<sup>3</sup>Department of Civil and Environmental Engineering, Princeton University

Industrial applications call for rapid, interference-free and inline detection of impurities such as H<sub>2</sub>O, CO<sub>2</sub> and CO in various gas streams to ensure quality and performance. A mid-IR based laser impurity sensor has been developed to detect sub ppm level of H<sub>2</sub>O and ppb level of CO for commercial applications. The sensor is an ATEX certified (Class I, Div. 2)/non-incendiary device which is safe to operate for hazardous areas from -40°C to 50°C with a system lifetime of ~10 years. Integrated with a sealed inline reference gas cell, it needs no consumables, which reduces cost and simplifies maintenance.

