

A new on-chip mid-IR spectrometer for methane sensing

Bao, C., Yuan, Z., Wu, L. *et al.* Architecture for microcomb-based GHz-mid-infrared dual-comb spectroscopy. *Nat Commun* 12, 6573 (2021). <https://doi.org/10.1038/s41467-021-26958-6>

Scientific Achievement

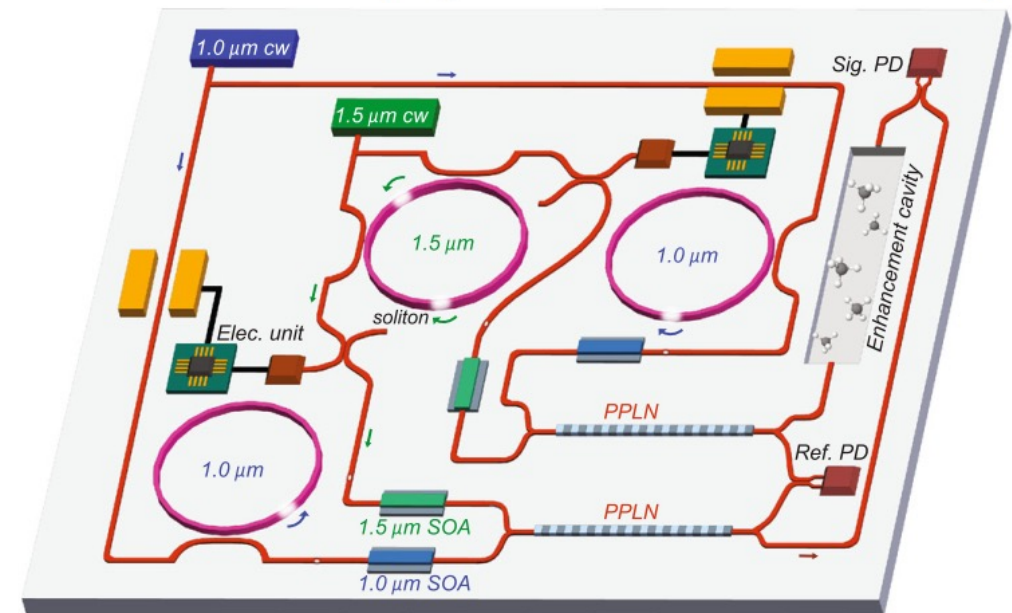
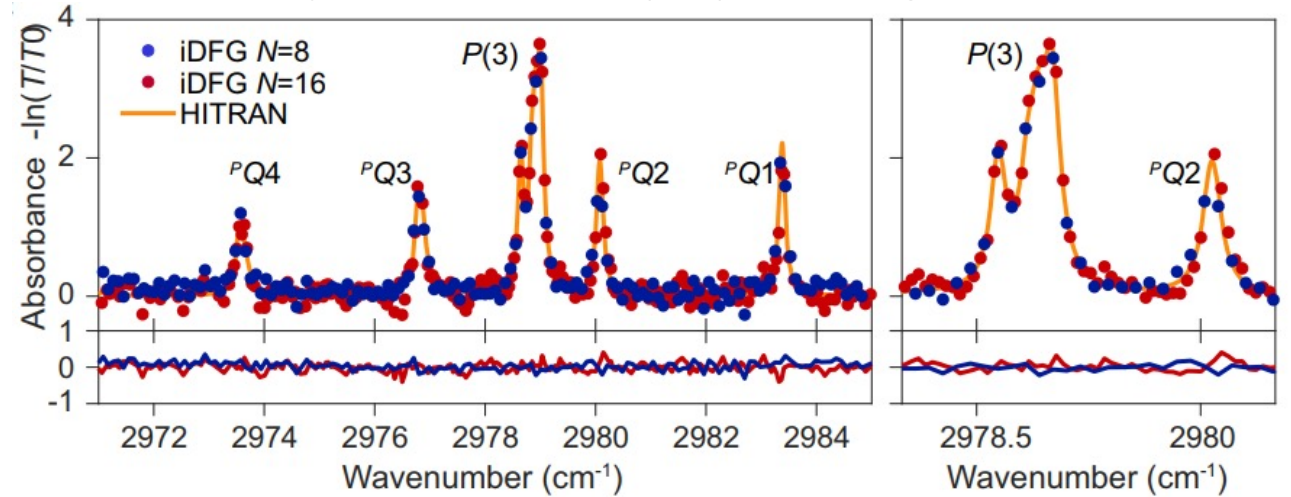
- On-chip microcomb-based mid-infrared dual-comb spectroscopy (DCS) with GHz resolution for trace gas sensing

Significance and Impact

- Compact, highly sensitive, scalable gas sensors that can be used for field monitoring of greenhouse gases

Technical Details

- Interleaved difference-frequency-generation (iDFG) used for GHz mid-IR comb generation
- Counter-propagating (CP) solitons from a single silica microcavity for improved stability and simplified system architecture



Top: iDFG based DCS for methane/ethane with high and tunable resolutions. Bottom: Conceptualization of CP and iDFG based portable DCS gas sensors. Copyright Springer-Nature, 2021.