

Optical power detector (UNIDET) based on cantilever-enhanced photoacoustic method

Characterization and optimization of infrared absorbers:

1. J. Rossi, J. Uotila, S. Sharma, T. Laurila, R. Teissier, A. Baranov, E. Ikonen, M. Vainio, "Photoacoustic characteristics of carbon-based infrared absorbers," *Photoacoustics* **23**, 100265 (2021). [Link](#)

Optimization of the photoacoustic detection method:

2. S. Sharma, T. Laurila, J. Rossi, J. Uotila, M. Vainio, F. Manoocheri, E. Ikonen, "Electromagnetic radiation detection using cantilever-based photoacoustic effect: A method for realizing power detectors with broad spectral sensitivity and large dynamic range," *Sensors and Actuators A*, 113191 (2022). [Link](#)

First demonstration of a novel electronic power detector (UNIDET) from UV to far-IR:

3. J. Rossi, J. Uotila, S. Sharma, T. Hieta, T. Laurila, R. Teissier, A. Baranov, E. Ikonen, M. Vainio, "Optical power detector with broad spectral coverage, high detectivity and large dynamic range," *Opt. Lett.* **47**, 1689-1692 (2022). [Link](#)

Extension of the UNIDET concept to the THz region:

4. S. Sharma, M. Ahmadi, J. Rossi, M. Vainio, Z. Sun, A. Steiger, and E. Ikonen, "Terahertz radiation detection with a cantilever-based photoacoustic sensor," *Opt. Express* **30**, 43417-43425 (2022). [Link](#)

Application of the cantilever-enhanced photoacoustic detection method to sensing

Spectroscopic detection of radioactive molecular species:

5. J. Karhu, T. Tomberg, F. Senna Vieira, G. Genoud, V. Hänninen, M. Vainio, M. Metsälä, T. Hieta, S. Bell, and L. Halonen., "Broadband photoacoustic spectroscopy of $^{14}\text{CH}_4$ with a high-power mid-infrared optical frequency comb," *Opt. Lett.* **44**, 1142 (2019). [Link](#)
6. S. Larnimaa, L. Halonen, J. Karhu, T. Tomberg, M. Metsälä, G. Genoud, T. Hieta, S. Bell, M. Vainio, "High-resolution analysis of the ν_3 band of radiocarbon methane $^{14}\text{CH}_4$," *Chem. Phys. Lett.* **750**, 137488 (2020). [Link](#)
7. M. Fatima, T. Hausmaninger, T. Tomberg, J. Karhu, M. Vainio, T. Hieta, G. Genoud, "Radiocarbon dioxide detection using cantilever-enhanced photoacoustic spectroscopy," *Opt. Lett.* **46**, 2083-2086 (2021). [Link](#)
8. S. Larnimaa, M. Vainio, V. Ulvila, "Infrared spectroscopy of radioactive hydrogen chloride H^{36}Cl ," *Journal of Quantitative Spectroscopy and Radiative Transfer* **277**, 107984 (2022). [Link](#)

Other spectroscopy and sensing:

9. T. Tomberg, T. Hieta, M. Vainio, L. Halonen, "Cavity-enhanced cantilever-enhanced photoacoustic spectroscopy," *Analyst* **144**, 2291 (2019). [Link](#)
10. T. Tomberg, N. Vuorio, T. Hieta, M. Jussila, K. Hartonen, M. Vainio, T. Mikkonen, J. Toivonen, M.L. Riekkola, L. Halonen, M. Metsälä, "Broadband laser-based infrared detector for gas chromatography," *Anal. Chem.* **92**, 14582–14588 (2020). [Link](#)
11. J. Karhu, T. Hieta, F. Manoocheri, M. Vainio, E. Ikonen, "LED based photoacoustic NO_2 sensor with sub-ppb detection limit," *ACS Sensors* **6** (9), 3303-3307 (2021). [Link](#)
12. J. Karhu, J. Kuula, A. Virkkula, H. Timonen, M. Vainio, T. Hieta, "Cantilever-enhanced photoacoustic measurement of light-absorbing aerosols," *Aerosol Sci. Technol.* **56**, 92-100 (2021). [Link](#)

Light sources for infrared spectroscopy and sensing:

13. M. Roiz and M. Vainio, "Versatile optical frequency combs based on multi-seeded femtosecond optical parametric generation," *Opt. Express* **30**, 17789-17805 (2022). [Link](#)
14. M. Roiz, J.-Y. Lai, J. Karhu, M. Vainio, "Mid-infrared frequency comb with 25 pJ threshold via CW-seeded optical parametric generation in nonlinear waveguide," *Opt. Lett.* **46**, 4037-4040 (2021). [Link](#)
15. M. Roiz, K. Kumar, J. Karhu, M. Vainio, "Simple method for mid-infrared optical frequency comb generation with dynamic offset frequency tuning," *APL Photonics* **6**, 026103 (2021). *Featured.* [Link](#)
16. V. Ulvila, M. Vainio, "Experimental study of the effect of phase mismatch on a CW-pumped cascaded quadratic nonlinear frequency comb," *IOP Journal of Physics: Photonics* **2**, 034006 (2020). [Link](#)
17. V. Ulvila, M. Vainio, "Diode-laser-pumped continuous-wave optical parametric oscillator with a large mid-infrared tuning range," *Opt. Commun.* **439**, 99 (2019). [Link](#)
18. M. Stefszky, V. Ulvila, Z. Abdallah, C. Silberhorn, and M. Vainio, "Towards optical frequency comb generation in continuous-wave pumped titanium indiffused lithium niobate waveguide resonators," *Phys. Review A* **98**, 053850 (2018). [Link](#)