iDFG for Spectral Densification of Mid-IR Microcombs

Chengying Bao, Zhiquan Yuan, Heming Wang, Lue Wu, Boqiang Shen, Keeyoon Sung, Stephanie Leifer, Qiang Lin, and Kerry Vahala, "Interleaved difference-frequency generation for microcomb spectral densification in the mid-infrared," Optica 7, 309-315 (2020) https://doi.org/10.1364/OPTICA.382992

Scientific Achievement

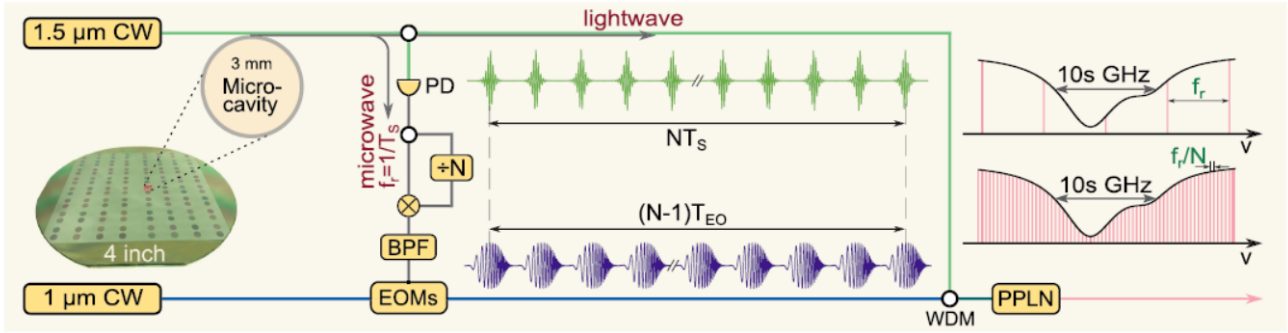
- We introduce a new technique for the generation of integrable mid-IR frequency combs: interleaved difference-frequency generation (iDFG).

Significance and Impact

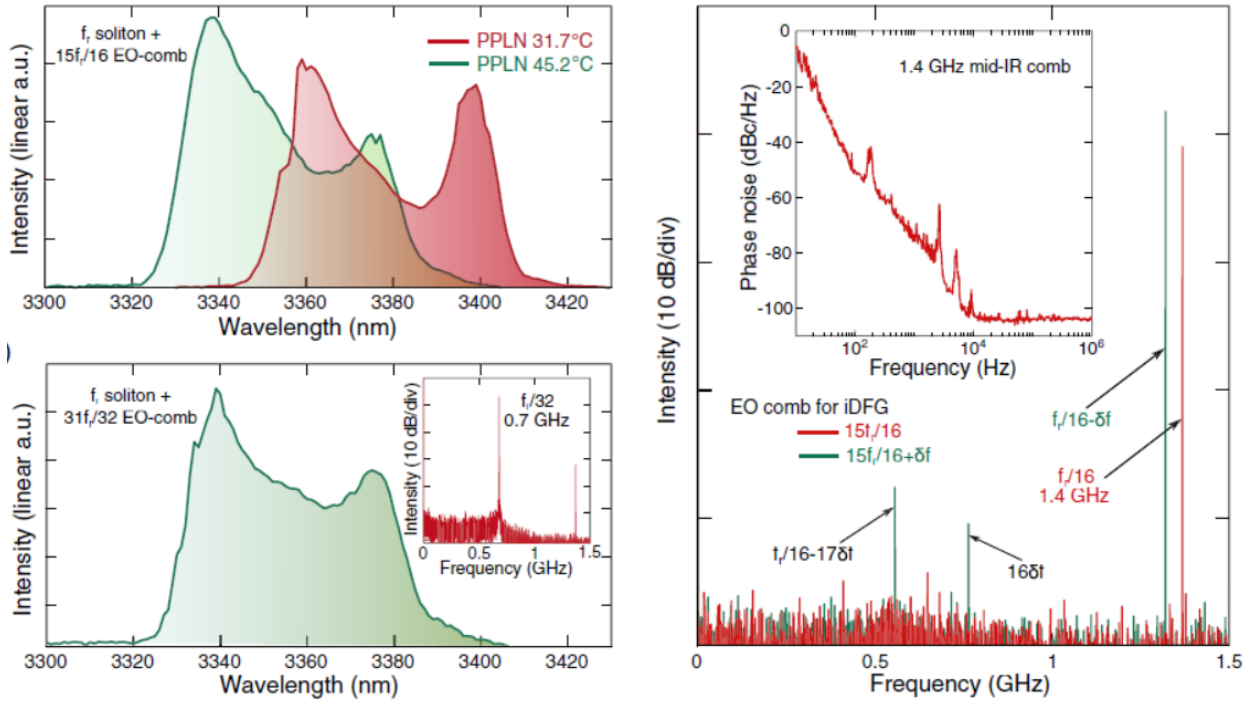
- The new iDFG method for narrow line spacing mid-IR comb generation can be integrated and used in methane emission measurement and chemical threat detection.

Technical Details

- Near-IR soliton used for both lightwave and microwave oscillators
- Soliton and electro-optical combs together with PPLN can be integrated, enabling compact comb modules and mass production
- Agile control of the line spacing in mid-IR



Experimental scheme towards integrated low repetition rate mid-IR combs using iDFG



Generation of mid-IR frequency combs with GHz line spacing using iDFG.

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