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Mid infrared gas absorption spectroscopy using a photonic chip-based supercontinuum

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We report the simulation of ultrafast pulse evolution along a silicon germanium waveguide. Pulse evolution of 205 fs duration and 2.35 kW peak power at 4.15 μm propagating through a 5 cm long silicon germanium on silicon substrate waveguide was simulated by solving the generalised nonlinear Schrödinger equation using the fourth order Runge-Kutta in the interaction picture method. Coherent supercontinuum covering more than one octave from 2.61 μm to 8.15 μm (relating to a bandwidth of 5.54 μm) at -30 dB was achieved. This simulated mid infrared spectra was used in the simulation of gas absorption spectroscopy for carbon dioxide and methane gases. Absorbance spectra of these greenhouse gases were calculated from the resolution of the Beer-Lambert equation. The computed absorbance spectra agree well with the absorbance spectra found on the high-resolution transmission (HITRAN) spectral database.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

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