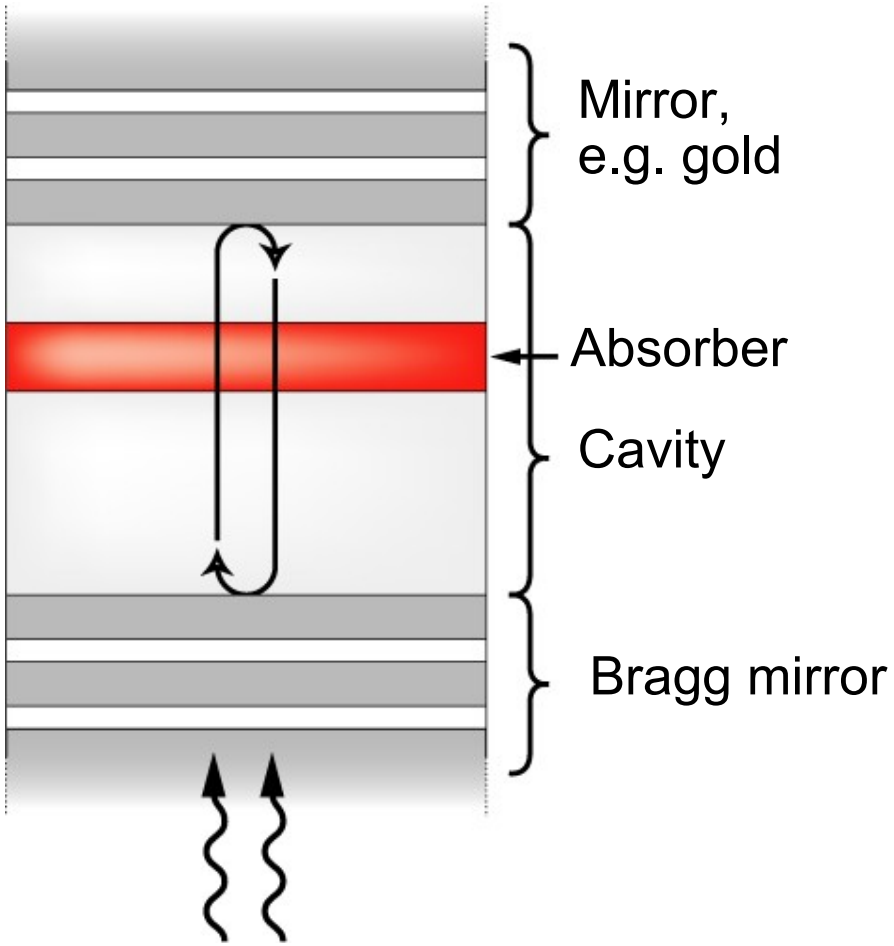
Resonant Cavity Enhanced Detector (RCED)

Concept: combination cavity + photodetector

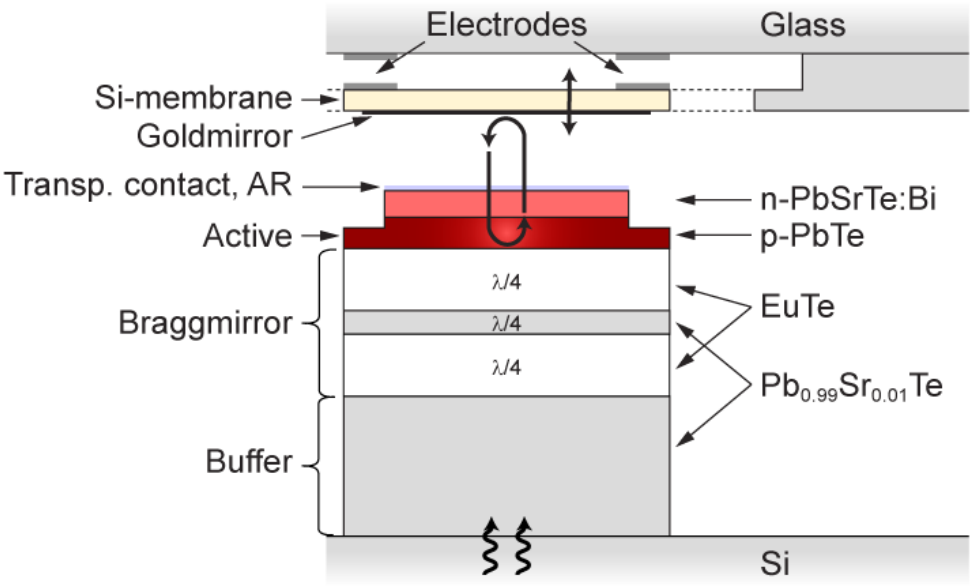
- Narrow spectral sensitivity
- Thin active layer
- High quantum efficiency
- Lower noise limit when compared to traditional absorber-filter-system: smaler volume
- Cavity length defines wavelength and order of resonances



Tunable RCED

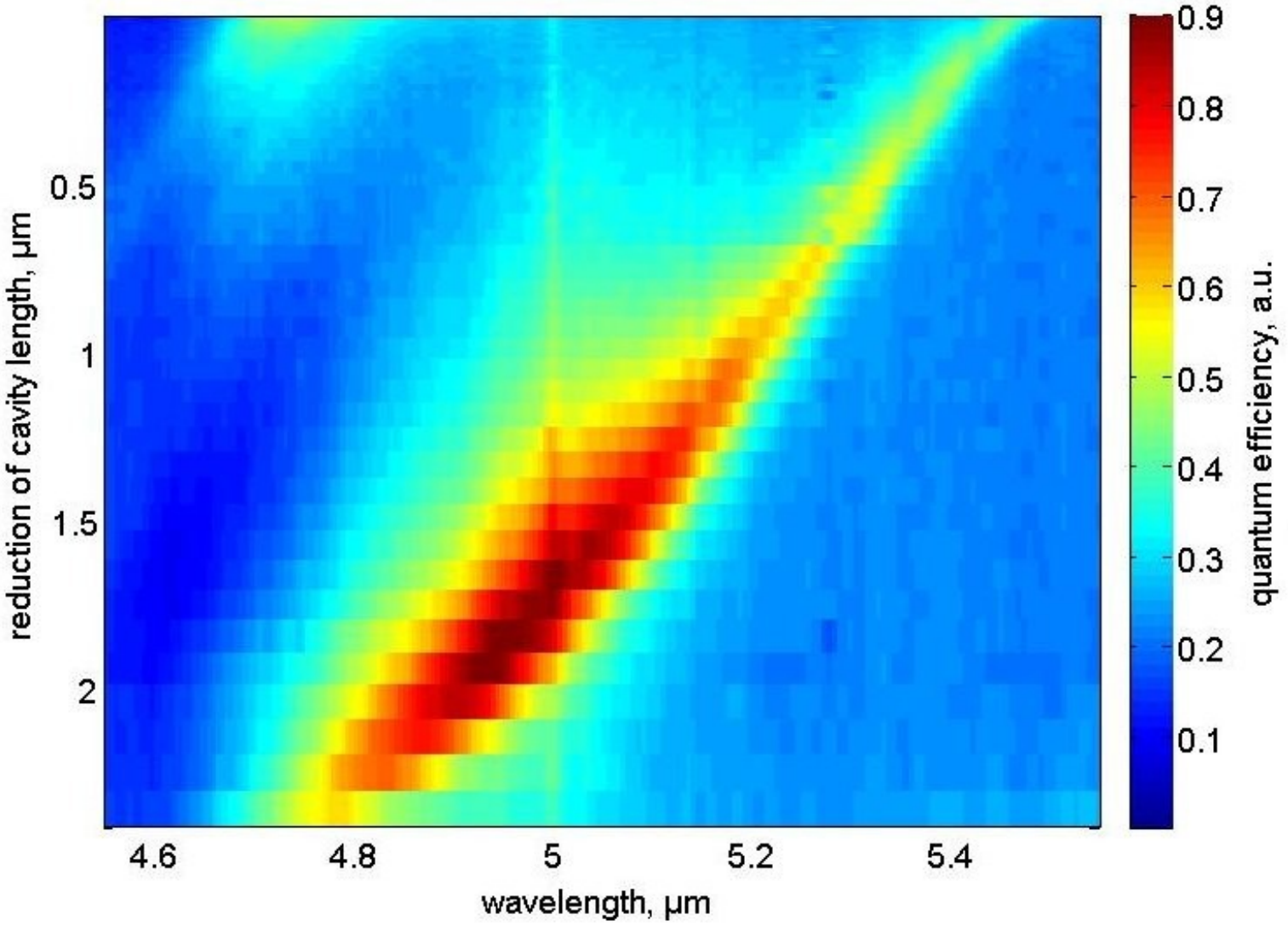
Realized tunable RCED with MEMS micromirror

- Mirror movement towards diode chip:
  - $d \sim U^3$
  - $\Delta d \sim 2.5\ \mu m$
- Original cavity length:
  - 17 µm
  - 10 µm external



N. Quack et al.,
Sensors 2008, 8 (9)

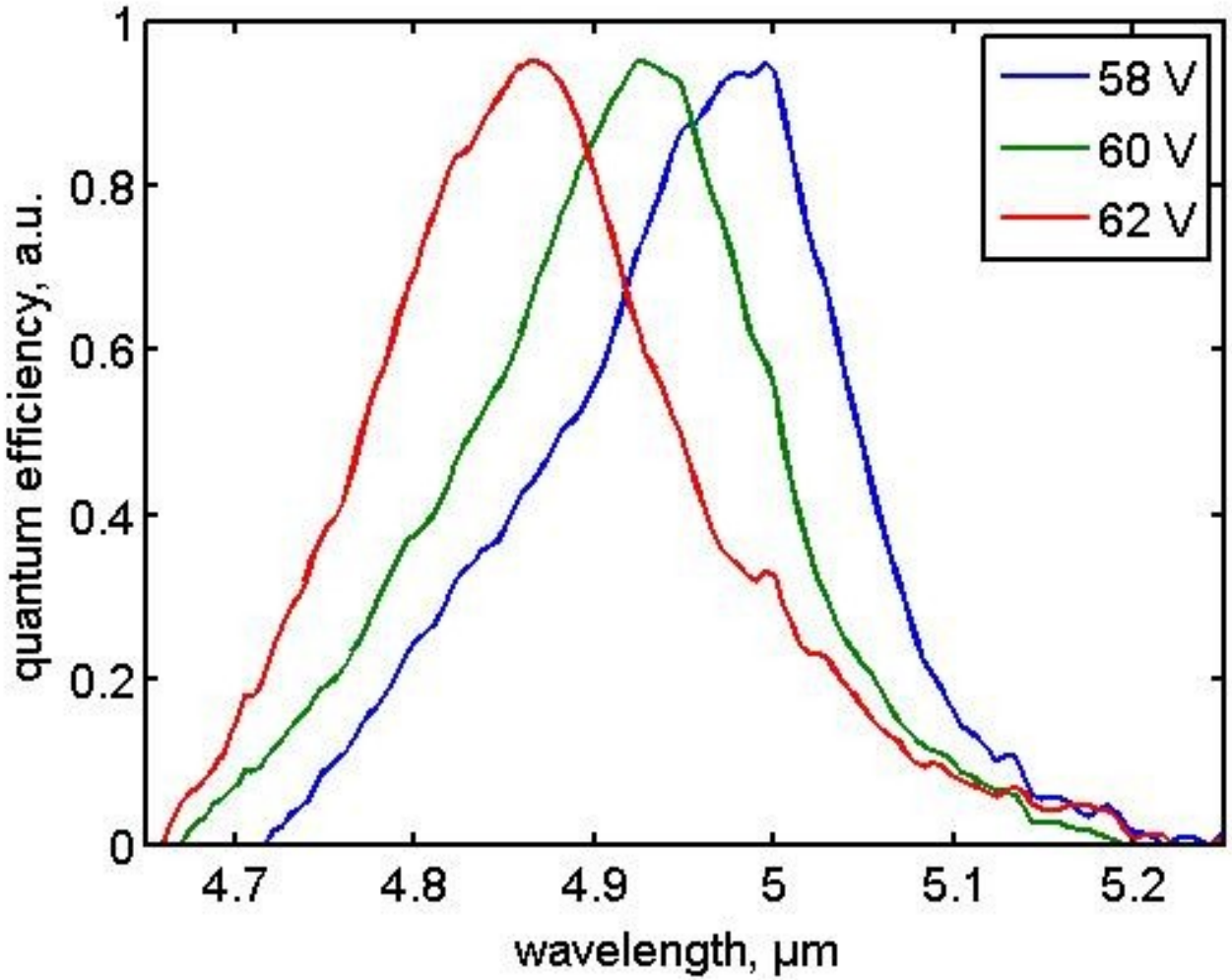
Tunable RCED



MEMS Setup

100 K

Tunable RCED



MEMS Setup

100 K

Tunable RCED

Realized tunable RCED with MEMS micromirror

- Single mode (n = 6)
- ~ 2.5 µm mirror movement yields a shift to the next higher mode:
  4.8 µm - 5.4 µm
- QE not uniformly high: influence of buffer layer on reflectivity of the lower DBR
- Measurement at 200 K:
  4.2 µm CO_2 absorption

MEMS Setup

100 K