Resonant Cavity Enhanced Detectors (RCEDs)

place the absorber inside the cavity at an antinode of the standing wave pattern:

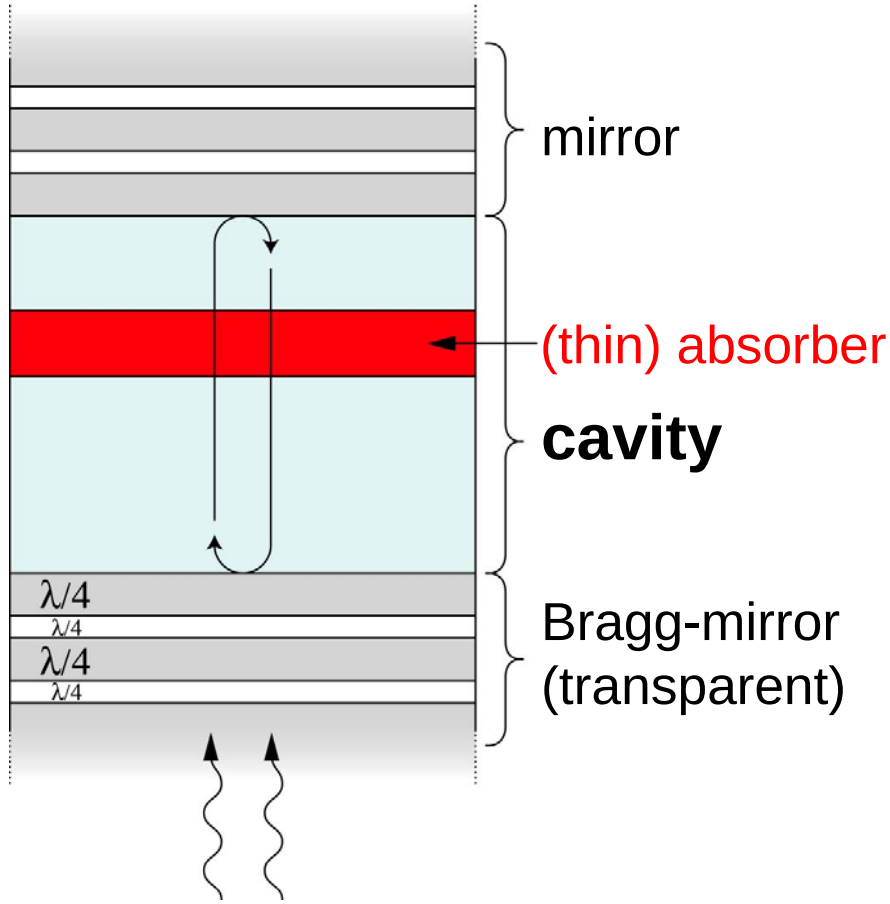
- peak wavelength λ_p determined by optical length
- narrow spectral width

  (given by Q of resonator)

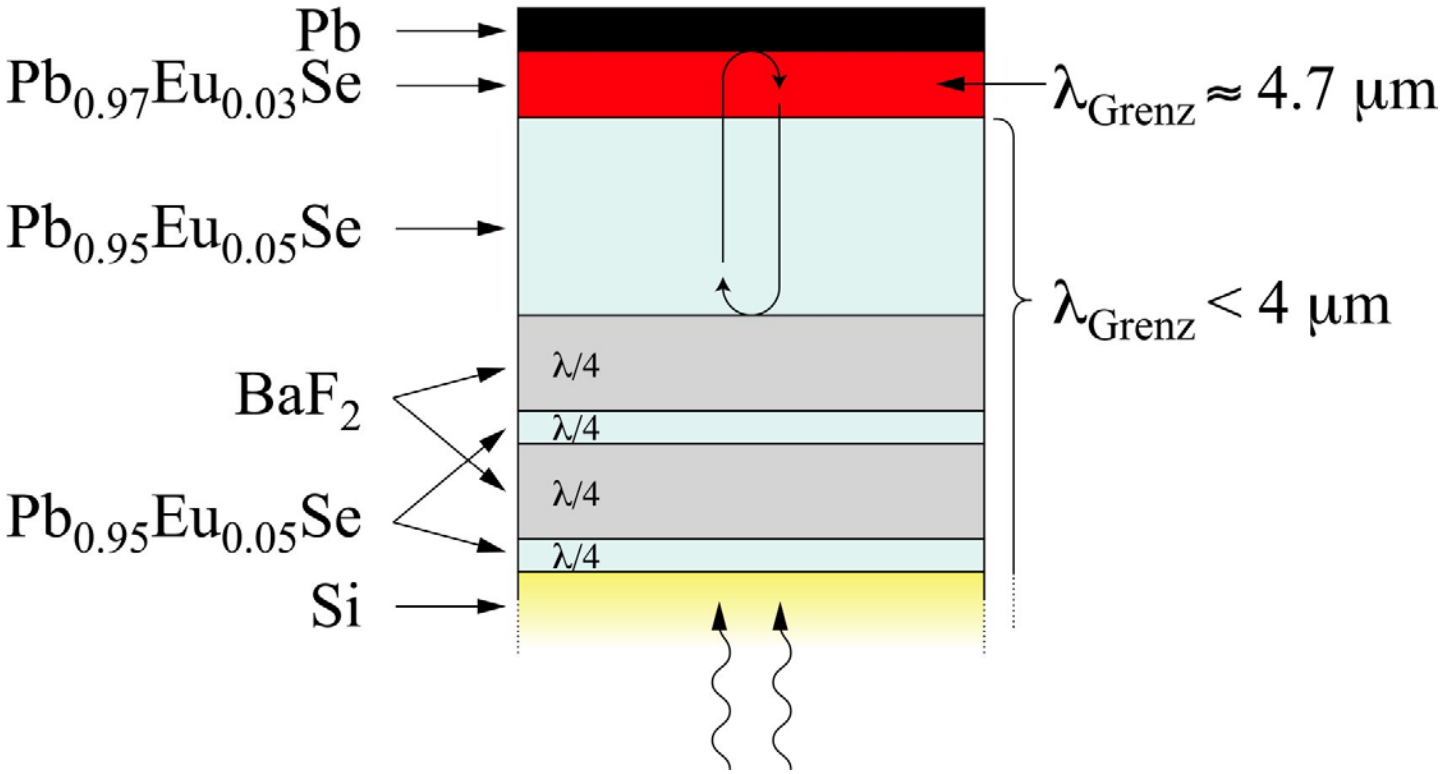
many passes across absorber :

- quantum efficiency $\eta \Rightarrow 1$
- thin absorber: high D*

  (small g-r volume!)



IV-VI (lead chalcogenide) RCED on Si-substrate

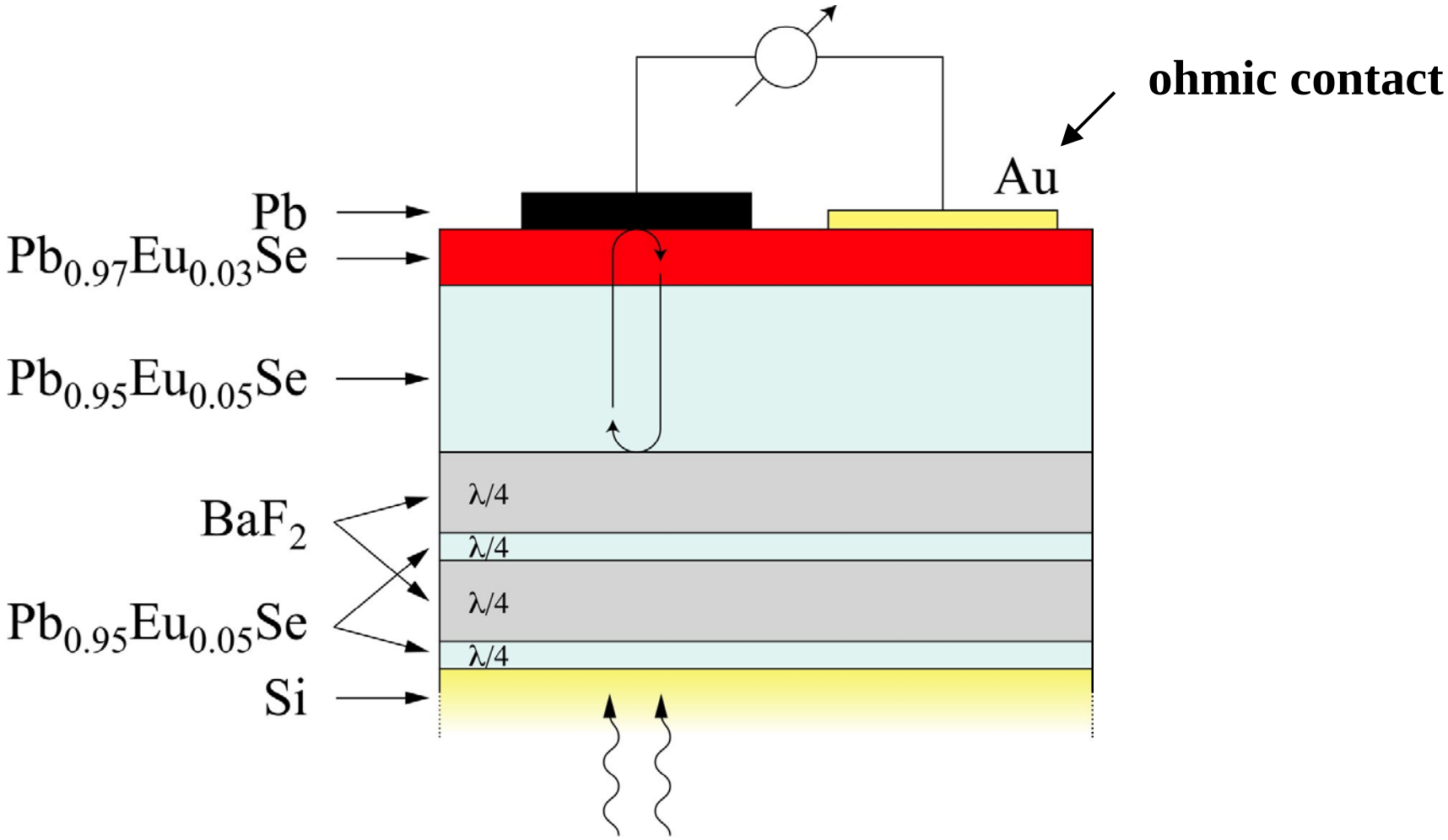


Top Pb-layer forms

- top mirror

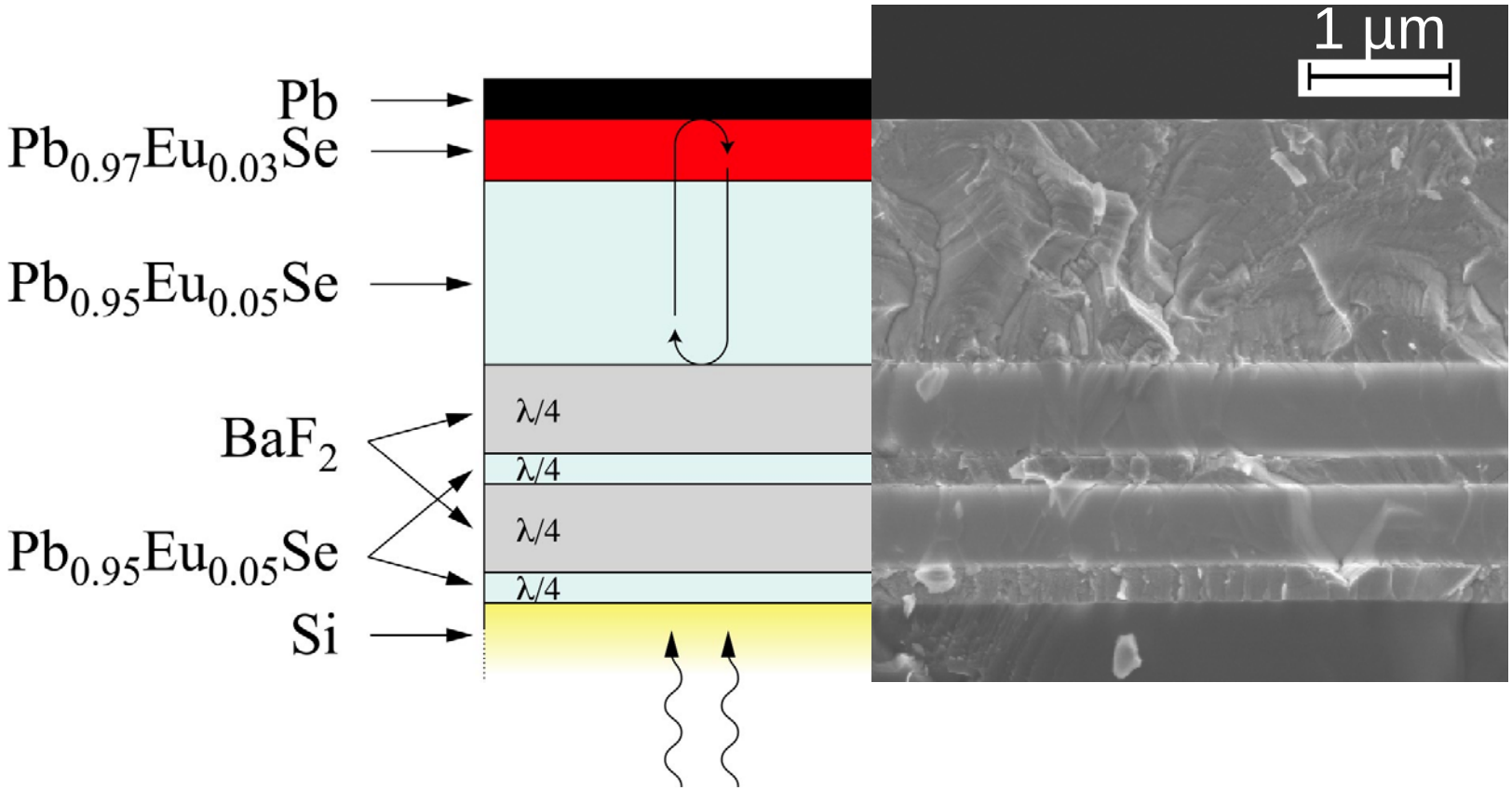
- metal-semiconductor blocking contact: photovoltaic detector

IV-VI RCED


ohmic contact
Au
Pb
$Pb_{0.97}Eu_{0.03}Se$
$Pb_{0.95}Eu_{0.05}Se$
BaF_2
$Pb_{0.95}Eu_{0.05}Se$
Si
λ/4
λ/4
λ/4
λ/4

IV-VI RCED realization:

MBE on Si-substrate

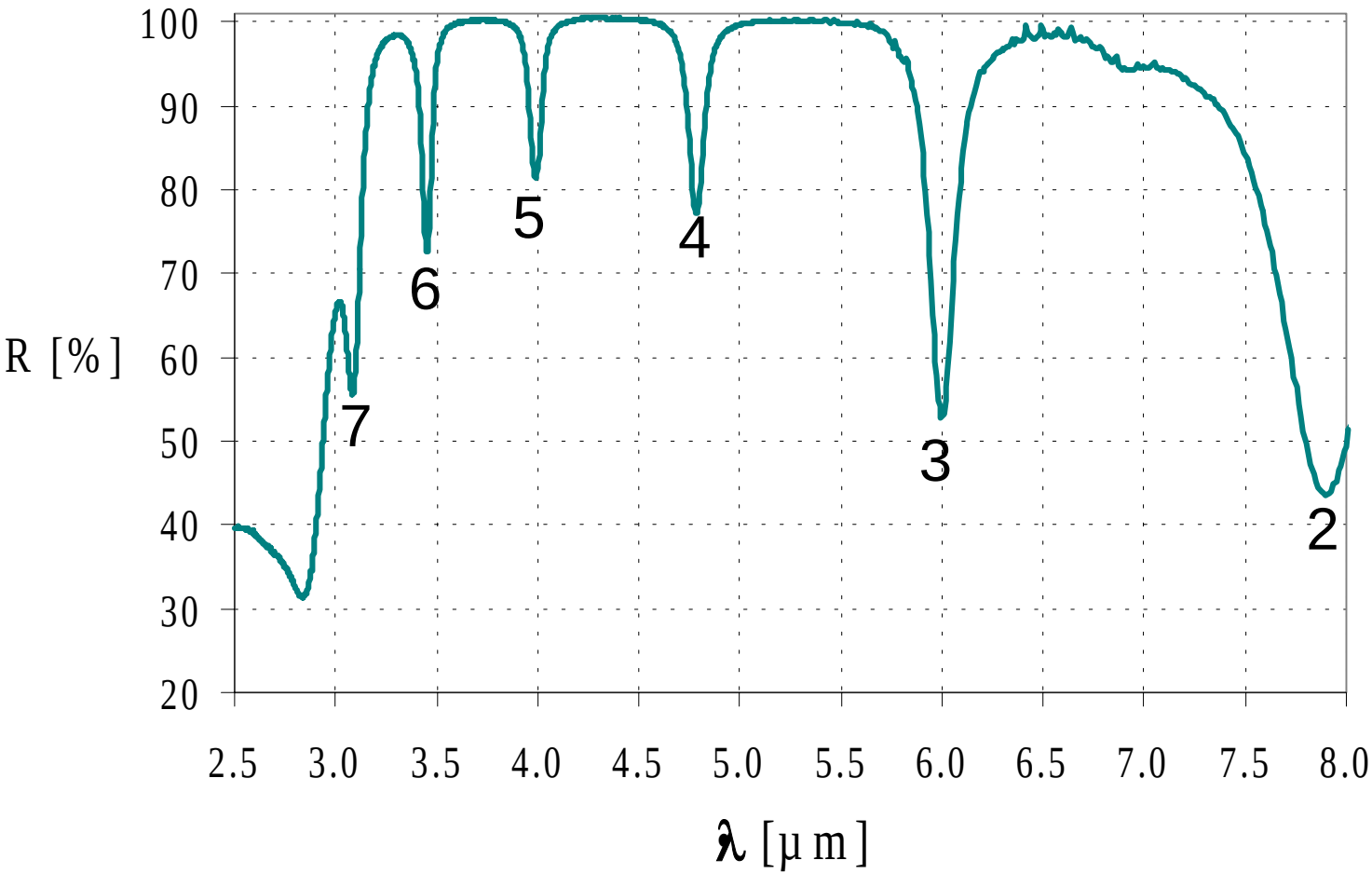


--> detector design: one resonance visible only because of:

- choice of cut-off wavelength

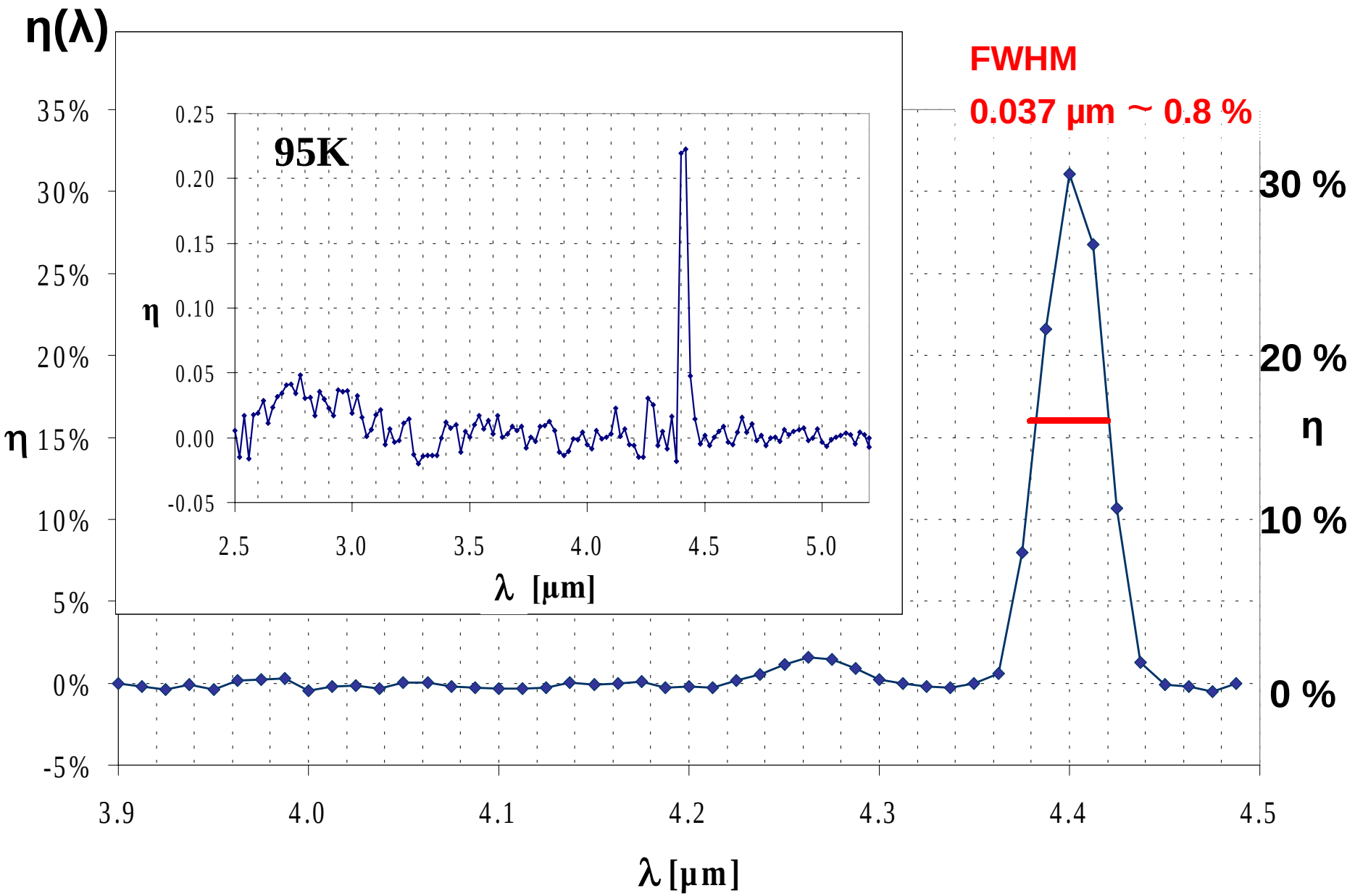
- choice of bandgap of mirror materials

Measured reflection(RT):



order #

RCED with $Pb_{0.97}Eu_{0.03}Se$-absorber, measured quantum efficiency:



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IV-VI RCED: measured sensitivity $R_0A(T)$:

above BNL
up to >150K