detection of single bacteria in drinking water
-
bio optical sensor

Optotransmitter Umweltschutz Technologie e.V.

working principle

- detection of the inherent fluorescence of bacteria at an excitation wavelength of 375 nm

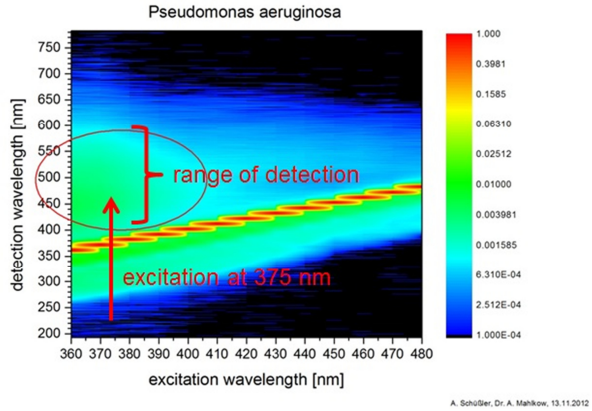

Figure 1: fluorescence measurement of ps. aeruginosa with a high concentration

construction

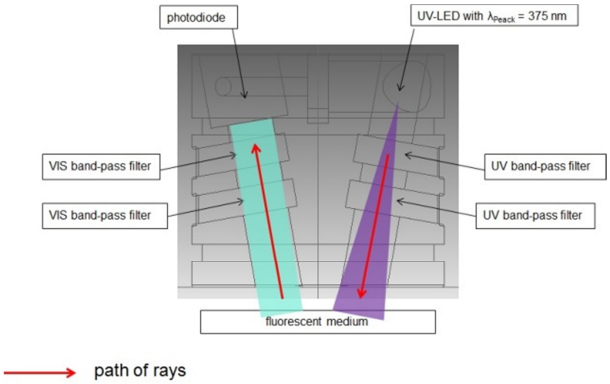

Figure 2: excitation and detection - principle

- on one side (excitation side):
  - first of all UV-LED with 375 nm
  - followed by two band-pass filter
  - ➢ transmission range of 350 nm to 390 nm
  - ➢ improvement of transmission properties and optical density
- on the other side (detection side):
  - two band-pass filter
  - ➢ transmission range of 420 nm to 520 nm
  - ➢ improvement of transmission properties and optical density
  - follows at closing the photodiode with integrated amplifier
  - ➢ sensitively on 400 nm up to 1100 nm

- electronic amplifier circuit with an offset compensation directly after the photodiode (set the dark signal to zero) and a low pass at the output (for smoothing the signal)
- amplification of the fluorescence signal by a factor of 50000

summary

- the current sensor has become so sensitive that it goes with the smallest scraps of paper in saturation (the limit is 12 Volt)
- it can be any fluorescent germ capture with a similar detection
  - ➢ this requires an adjustment of the band-pass filter and the LED (possibly also at the photodiode)

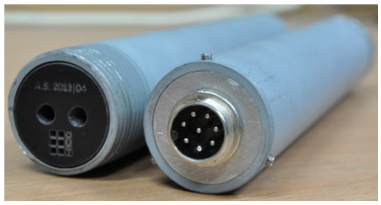

Figure 3: current sensor using a synthetic casing in black for the optical components

Figure 4: front view: excitation (right) and detection side (left)

Figure 5: precursor model with glass prism and still without casing in this figure