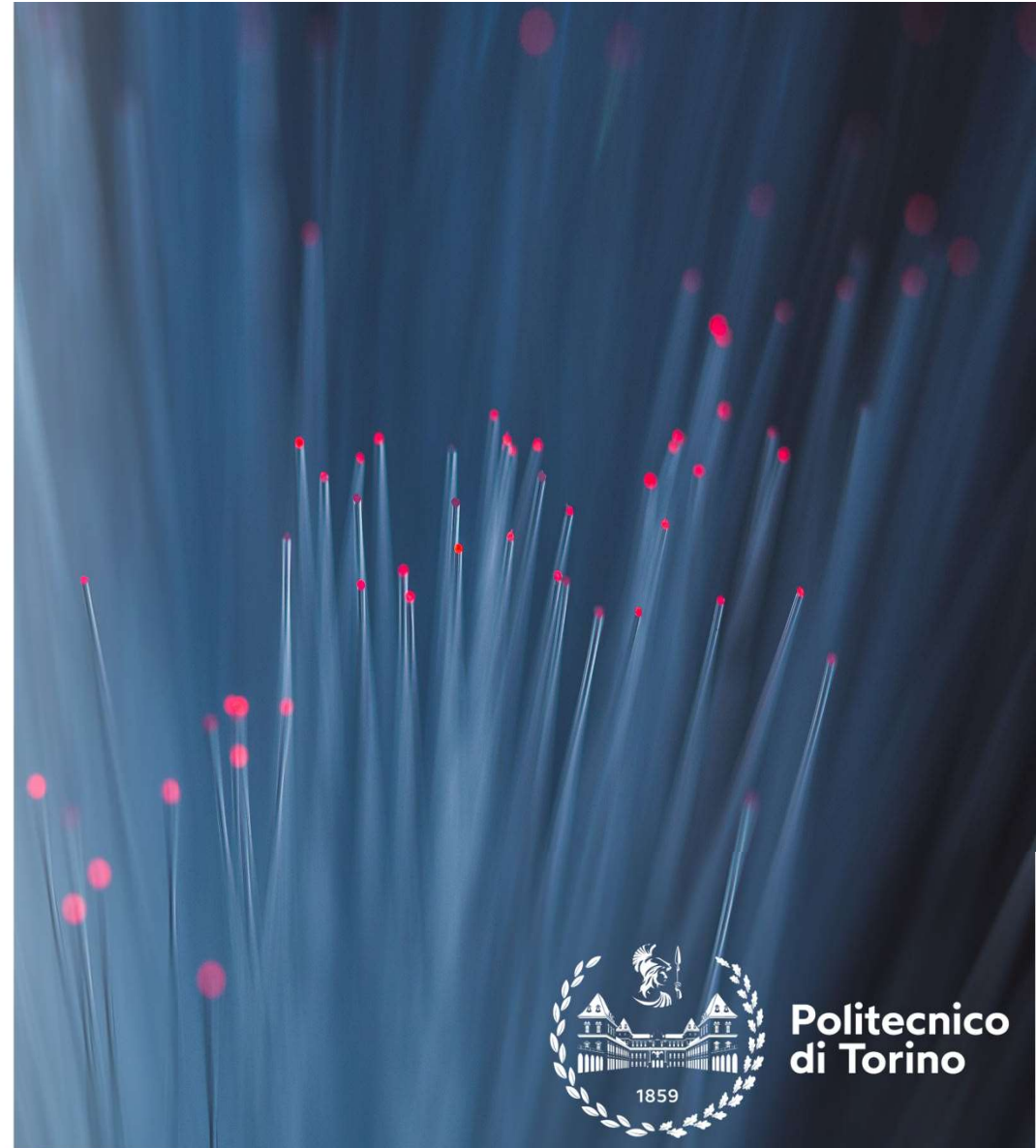


Fiber Optic Water Monitoring

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PHOTONEXT
RESEARCHER'S DAY 2023



**Politecnico
di Torino**



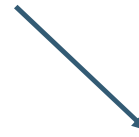
Main Goals



Investigation of methods for real-time low-cost water quality monitoring.



Refractive index measurement with an **optical fiber refractometer** based on SPR (Surface Plasmon Resonance).

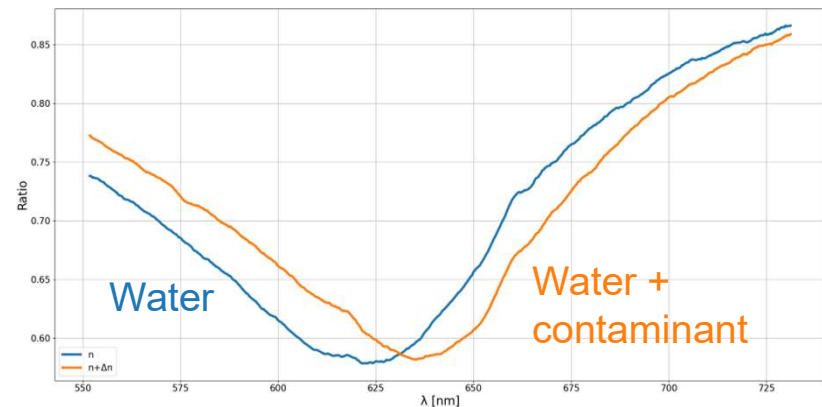
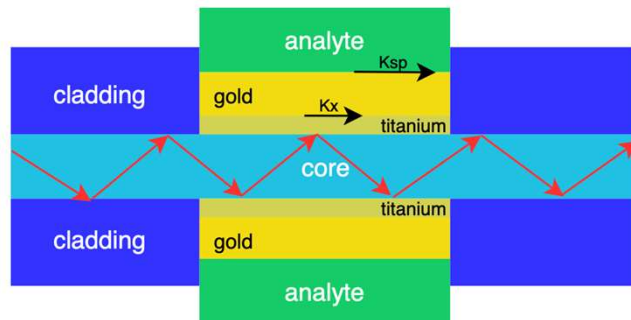


Fluorescence spectroscopy analysis for bacterial and pollution evaluation.



Surface Plasmon Resonance

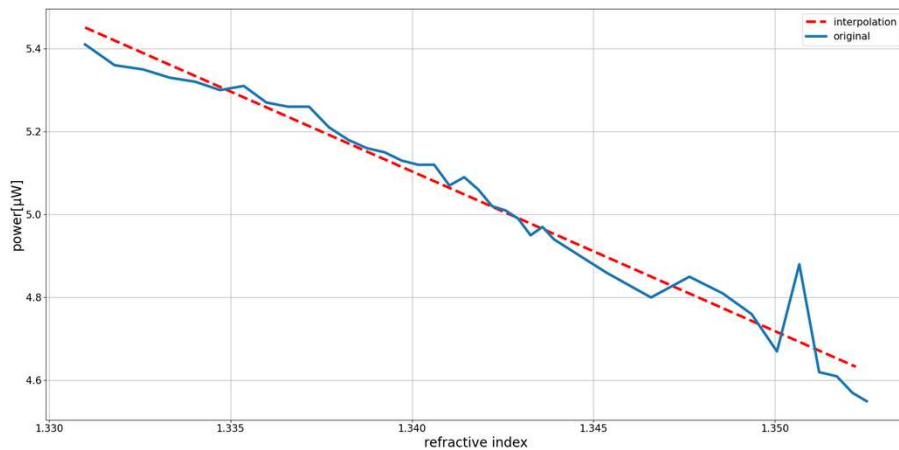
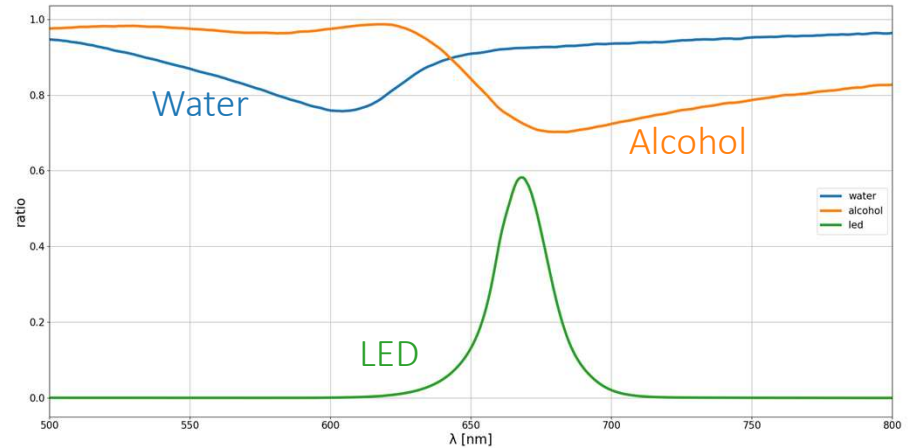
- SPR based refractometers can easily exceed **ppm** sensitivity.
- SPR sensors are fabricated by depositing a thin metal layer on the fiber core.
- SPR leads to a **notch spectral response** whose position depends on the RI of the analyte (e.g., water).





SPR Intensity Interrogation

- Low-cost interrogation can be implemented using LEDs to sample the sensor spectral response.
- Temperature effects must be compensated.

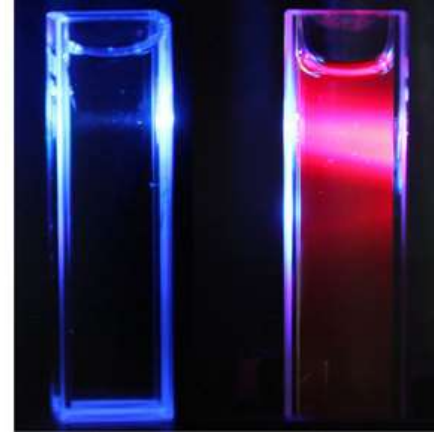
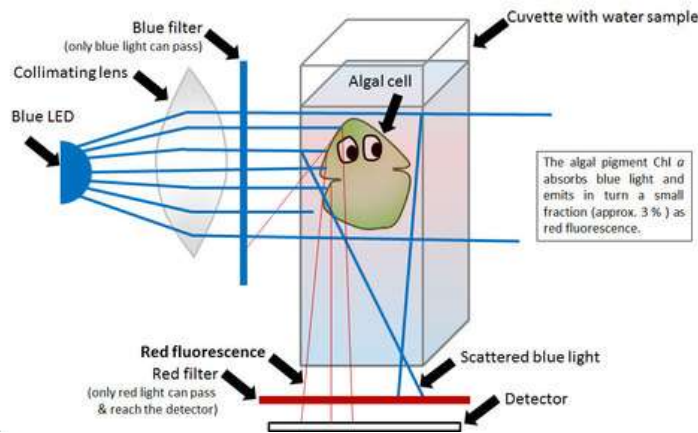


Preliminary results using alcohol in water: sensitivity 0.2 mW/RIU.



Fluorescence

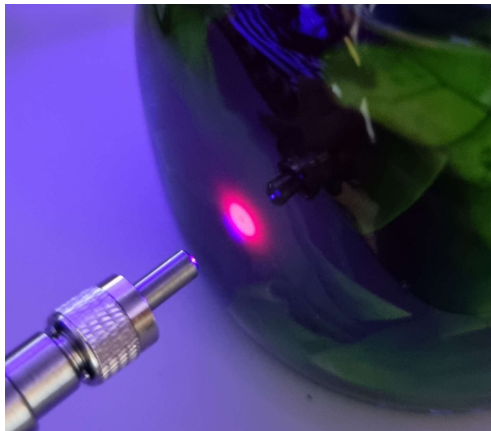
Fluorescence is an optical phenomenon for which (visible) light with a spectrum characteristic of the specific substance is emitted following an exposure of a substance to more energetic (UV) light.



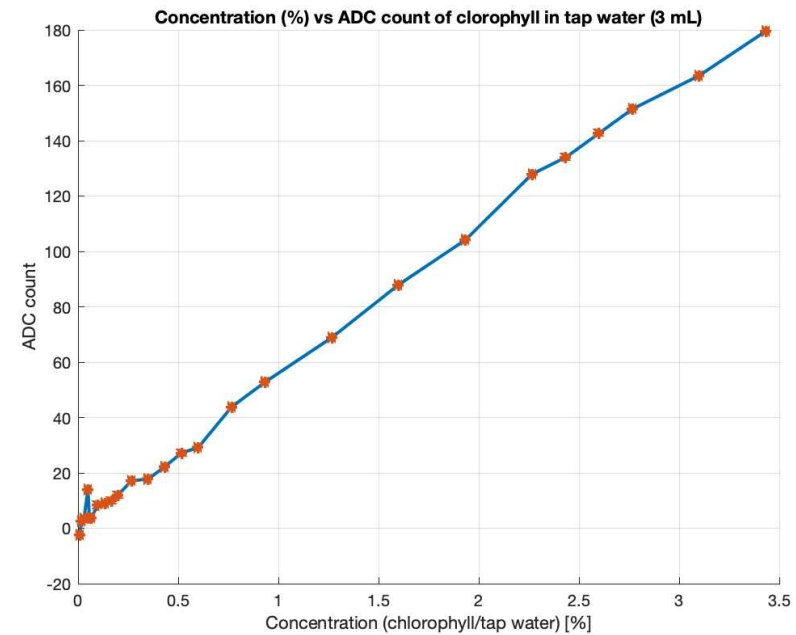


Fluorescence

Preliminary tests to evaluate the Limit of Detection (LOD) of the setup.



Chlorophyll irradiated with blue light re-emits in red.



Detection of 0.5 μ l of chlorophyll in 3 ml of water.

Thanks for your attention!



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