Development of CO2 surveillance sensing devices @ DTU Offshore

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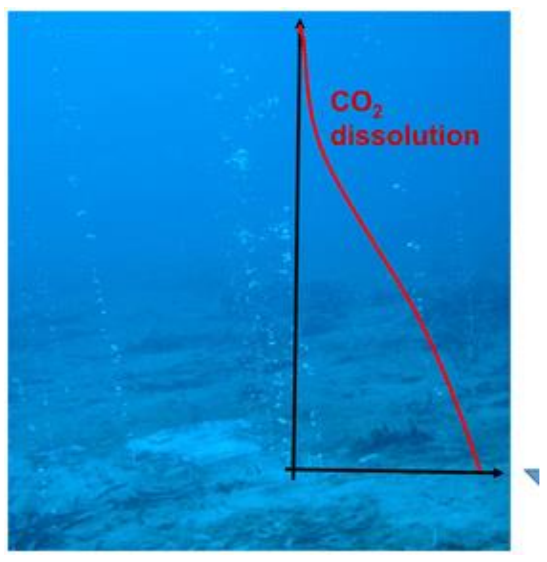
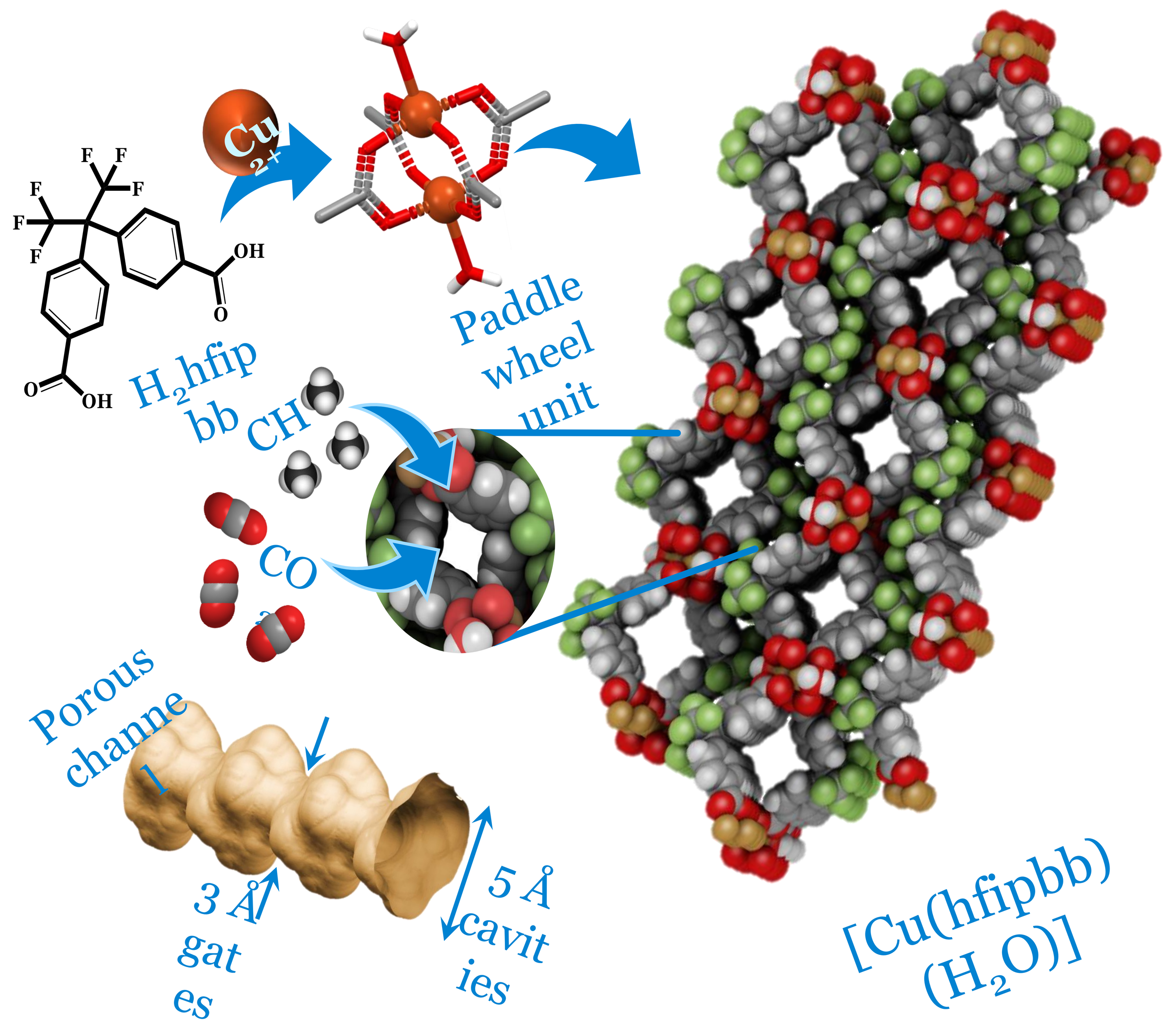
Carbon storage in geological formation requires (EU-directive) active monitoring of integrity.
Many solutions for leak detection have been proposed but might not fit the purpose as CO2 concentration levels very fast decrease up through the water column.
We develop chemical sensing by applying tailored metal organic frameworks (MOF), here shown in two configurations for local or distributed sensing. MOFs can be designed for adsorption of specific target molecules (Here CO2) and when desposited on a givne detection device (QCM or Optic fiber) it can be used as an accurate surveillance tool.

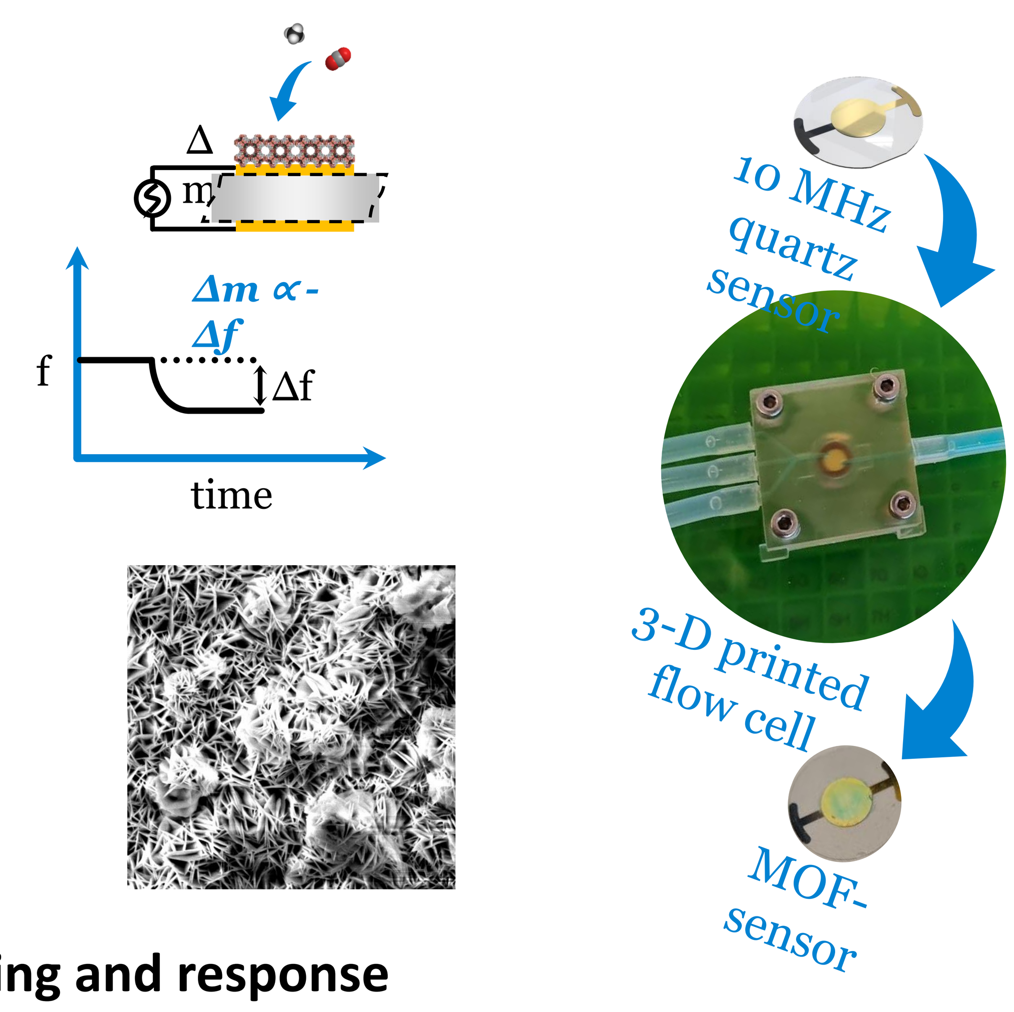




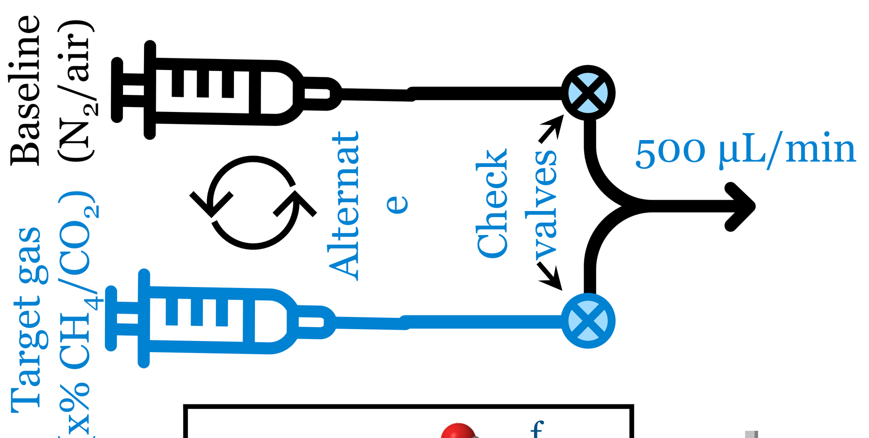
Quartz Crystal Microbalance (QCM Resonator) based sensor

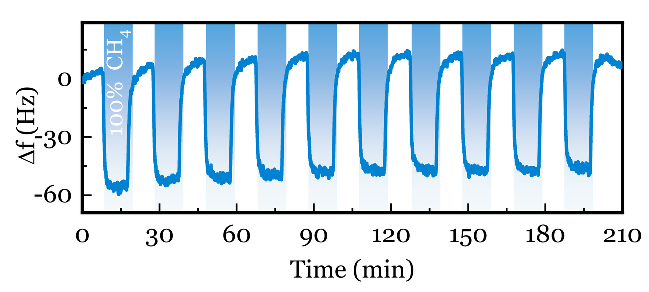
Single location measurement using QCM technology

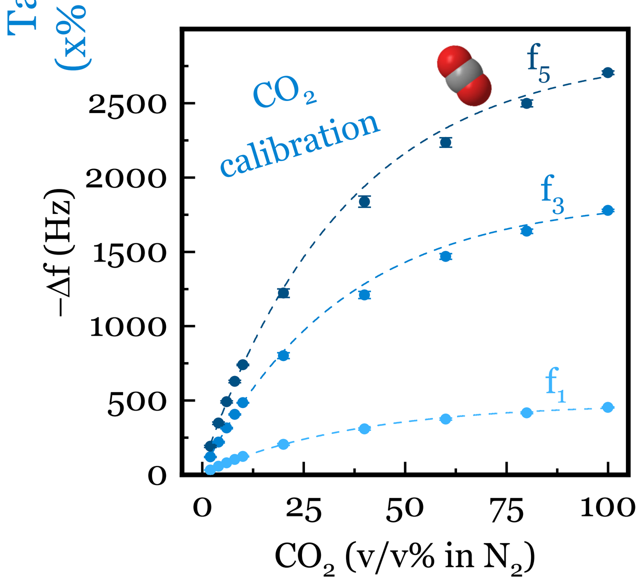
QCM Sensor structure and design

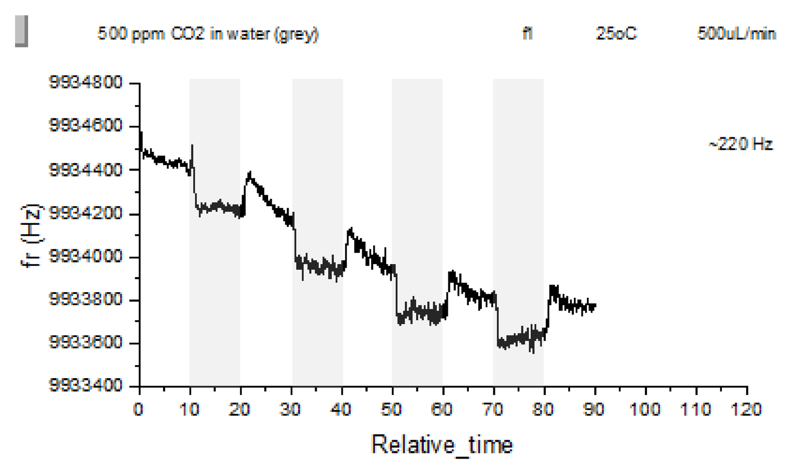


Testing and response









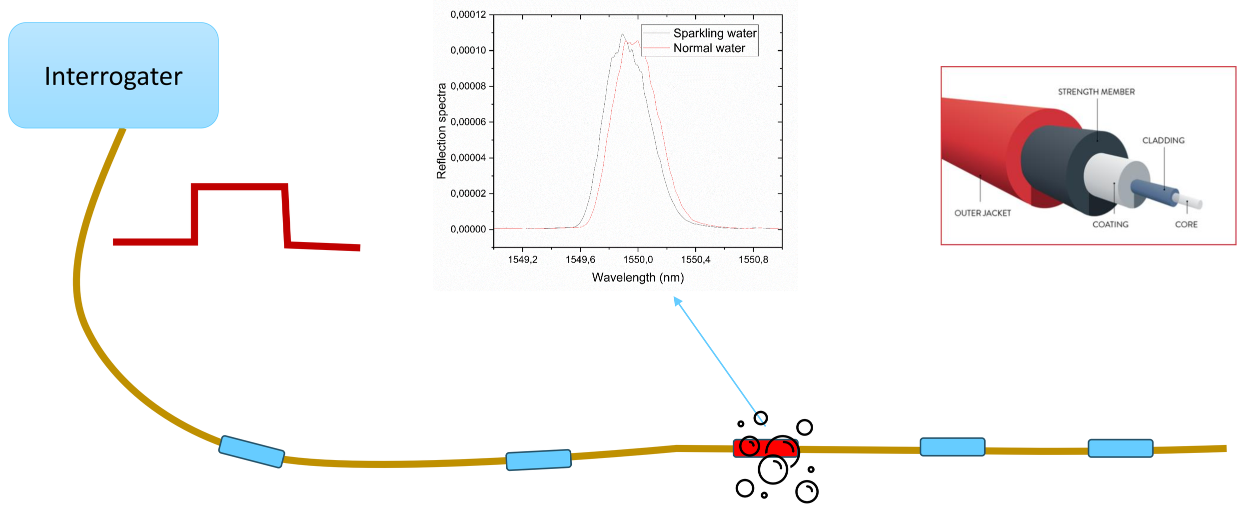
Gas phase analysis

CO2/water

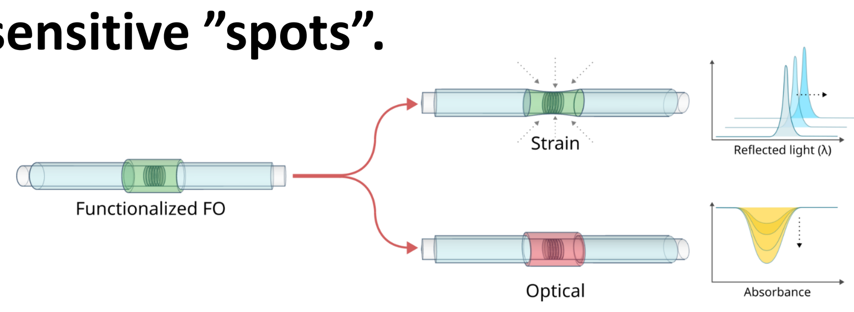
Optical Fiber as permanent monitoring

Goal: Permanent passive surveillance system

Fiber optics allow for ease of deployment and telemetry covering large areas

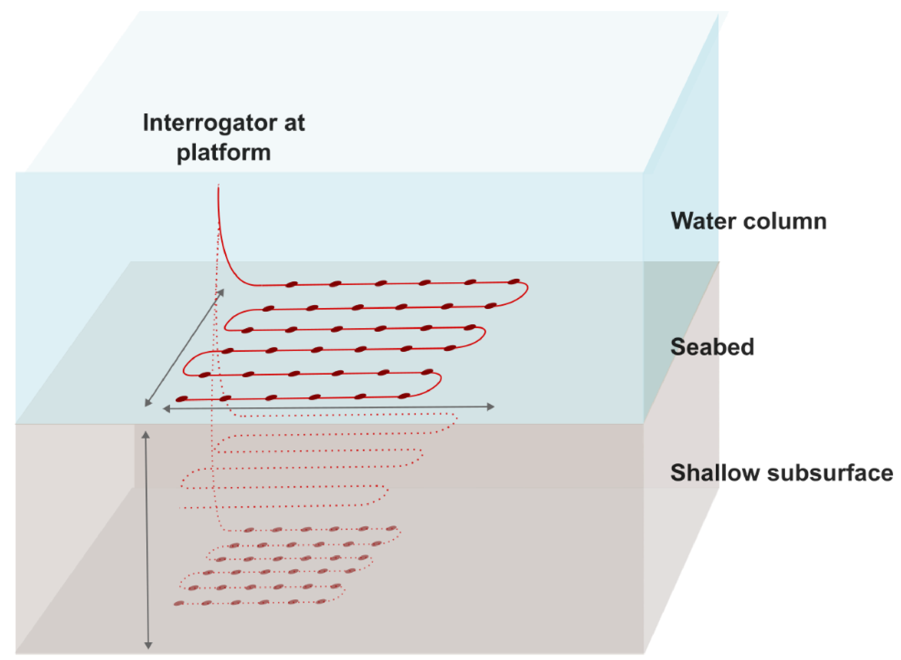


Functionalized optical fiber with distributed specialized CO2 sensitive "spots".



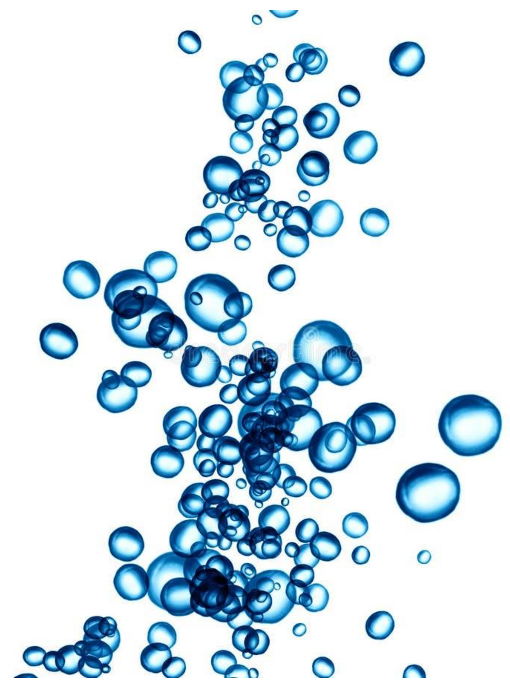
Response is sensed as either optical or as a strain or a combination.

Known technology from other applications



Deployed at/in seabed.

Same sensing chemistry and philosophy
– two different sensing and telemetric principles.
Designed for different applications and needs.



bifrost
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