European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir* COST Action TD1105

INTERNATIONAL WG1-WG4 MEETING on

New Sensing Technologies and Methods for Air-Pollution Monitoring European Environment Agency - EEA Copenhagen, Denmark, 3 - 4 October 2013 POSTER SESSION

Action Start date: 01/07/2012 - Action End date: 30/06/2016 - Year 2: 2013-2014 (Ongoing Action)

FIBER LOOP RING DOWN SPECTROSCOPY FOR TRACE CHEMICAL DETECTION



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FIBER LOOP RING DOWN SPECTROSCOPY



Strain Sensor Trace sample Detection

 FLRD

 Applications

 Biomolecular Analysis

 Pressure/Temperature Sensor

 FLRD is a time domain technique that measures optical losses of a light pulse in a fiber loop.

 Optical losses in the system are derived from fiber, couplers and connectors.

 These losses vary according to wavelength and materials used. Ultimate aim is to get lowest optical loss and highest efficiency.

 A sample material introduced on/in the fiber or an external stimulus causes additional losses.

 This additional loss can be used for sensing and spectroscopy.

Time



I: light intensity at time t

- L: length of the fiber
- c: speed of light
- n: fiber refractive index
- A: fiber transmission loss of the light in each round trip(%)
- $\boldsymbol{\tau_0}$: time required for I to decrease to I_0 (ring down time)
- B: total optic losses in the system except A
- $\pmb{\tau}$: time required for I to decrease to I_0 in the presence of sample

RESULTS



Thickness of amorphous silicon films on glass could be measured with this setup





CONCLUSIONS and Future Activities



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