



# Analysis of Anaerobic Digestion by MIR, NIR, UV/VIS online spectroscopy

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**Technology**  
**Arts Sciences**  
**TH Köln**



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# What am I doing?

- Investigating MEMS spectrometers for measurement in AD.
  - VFA sensor.
  - Gas phase.
- Developing machine learning techniques for data analysis.
- Predicting state of digester.
- Optimising the digester feeding rate.

# Why am I doing it?

- New emerging area of technology.
  - MEMS allows possibility of MIR measurements.
  - Price, robustness, size, etc.
- Better knowledge of system parameters.
- Allows optimisation of digester.
- Control based on gas measurements.
  - Existing model but has some drawbacks.

# How am I doing it?

- VFA Sensor.
  - Lab measurements.
  - Prototype sensitivity testing.
  - Develop model & simulate.
  - Test on pilot scale digester.
- Gas Sensor.
  - Lab work to check sensitivity.
  - Installation in pilot scale plant, landfill site.
  - Lab scale reactors feeding response profile test.
  - Develop model & simulate.
  - Test on pilot scale digester.

# Results and Impact

- Results.
  - VFA sensor prototype still being improved.
  - Gas sensor methane results very promising.
  - Average prediction error of 0.95%.
  - Good response to rapid changes.
- Impact.
  - Gas sensor as alternative to traditional IR or catalytic sensors.
  - Gas sensor & gas meter could be sufficient to control feeding rate.



Thanks for listening



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