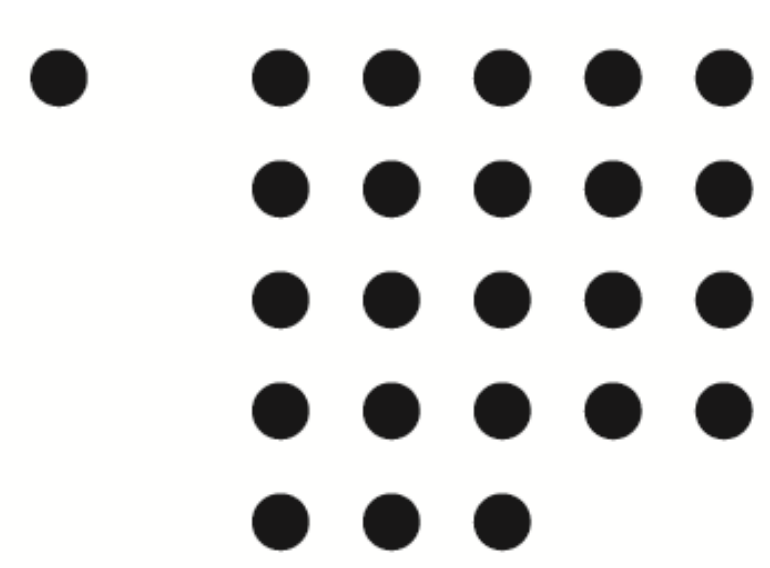




Research Interest: Analysis of anaerobic fermentation process by online spectroscopic measurement

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Research Interest

In anaerobic digestion for the production of biogas, there is a lack of robust, reliable and affordable instrumentation. It is typical that biogas plant operators are not certain as to the conditions inside the digester, and so operate the digester conservatively, as the consequences of a digester failure are very expensive. The research interest for this project is to investigate the effectiveness of new sensors which could provide a more affordable and reliable alternative to existing sensors, and provide process information which could be used for the optimisation of the anaerobic digestion process.

PhD Project

This project is investigating the use of Microelectromechanical (MEMS) spectroscopic sensors for the measurement of anaerobic digestion process parameters, with particular focus on the Mid infrared (MIR) region. Machine learning methods are then applied to the spectral data to analyse the spectra, and estimate the concentrations of the process parameters. The calculated values can then be used in a model to optimise the digester operation. The MIR region is of particular interest, as it is hoped that it will be possible to create generic machine learning methods that could be used on a wide range of substrates [1]. This is not possible with near infrared (NIR) sensors, and for each substrate type, a new model must be created.

Externally Funded Projects

- Marie Curie Advanced Technologies for Biogas Efficiency Sustainability and Transport (ATBEST) Project, Grant Agreement Number 316838.
- German-Finnish joint SME R&D Project “MEMS-BIOPRO”

Collaborations

- GECCO>C
- Campus Leverkusen
- art photonics GmbH
- Spectral Engines
- Bergischer Abfallwirtschaftsverband

References

[1] Gaida, D., Wolf, C., Eccleston, R., Bongards, M., 2015. Optimizing anaerobic co-digestion plants: MIR online instrumentation and dynamic real-time substrate feed optimization. at - Automatisierungstechnik 63, 543–552. doi:10.1515/auto-2014-1154