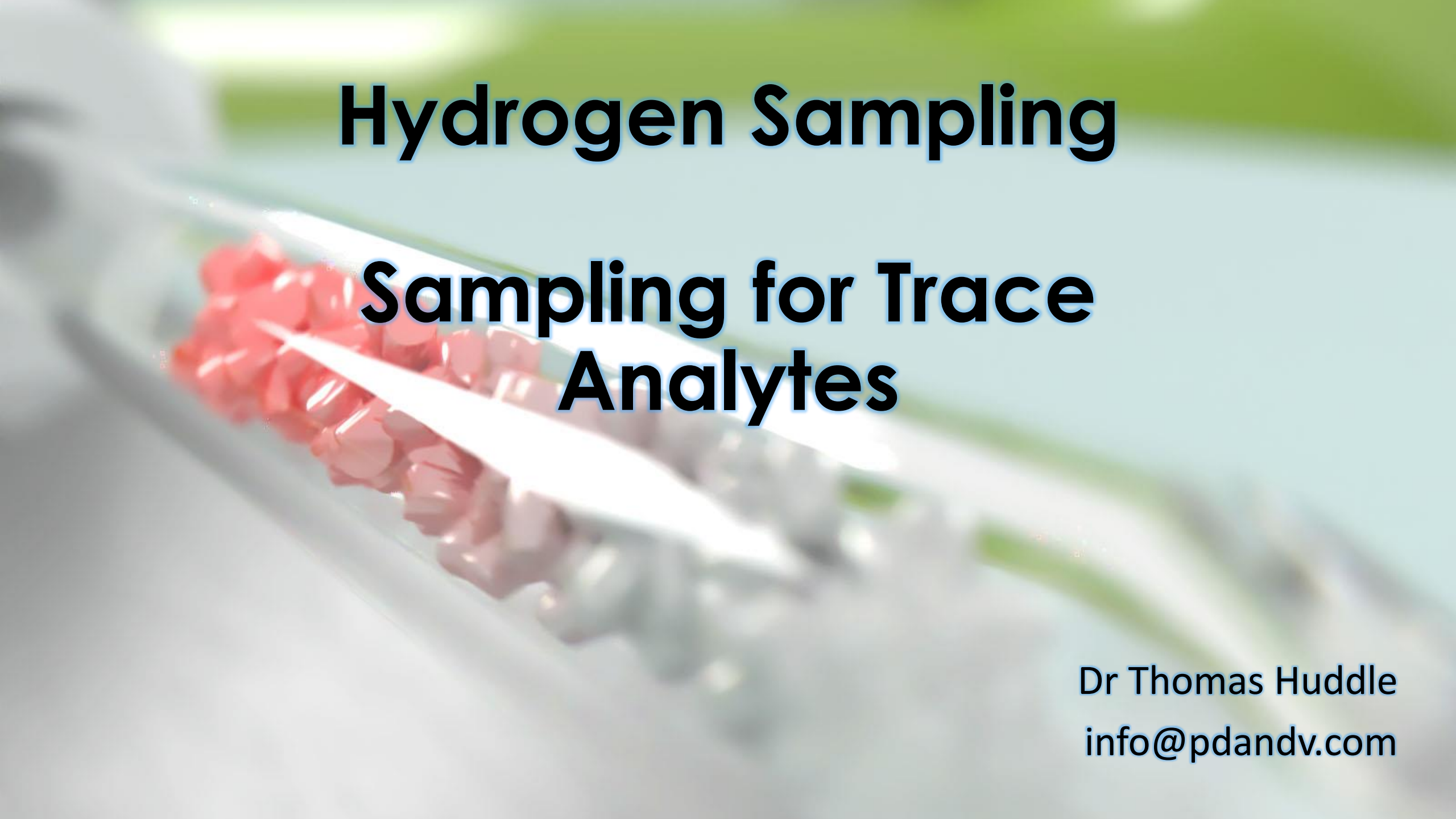

Hydrogen Sampling

Sampling for Trace Analytes

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Contents

- The **increasing** importance of Trace Analytes
- Issues with sampling Trace Analytes
- Overcoming common issues through Technology
- Conclusions

Why are Trace Analytes are (BECOMING MORE) Important

- Contaminant limits of Biomethane for Grid Injection and Transport
- Contaminant limits for Hydrogen (PEM technology)
- Catalyst Poisoning in Advanced Chemical Processing
- Mercury in Natural Gas, especially for LNG
- Traditional applications such as Odorants and Sulphur Compounds in Natural Gas

Sampling for Impurities in Biomethane and Hydrogen for PEM

- Stringent requirements for Biomethane Grid Injection and use in Transport BS EN 16723
- Work in ISO TC 193 SC1/WG 25 Biomethane
- ISO 21087 - Gas analysis - Analytical methods for Hydrogen Fuel - Proton Exchange Membrane (PEM) Fuel Cell applications for Road Vehicles

Issues with Sampling Trace Analytes

- Sampling Equipment prone to affect Sample
- Analytes can be lost on journey from Sampling Point to Analyser
- Contamination during cycled Sampling
- Traditional Sampling Methods, Equipment and Assembly need extreme attention to detail to extreme limits of Contamination

MAINTING A REPRESENTATIVE SAMPLE

Trace Analyte Capture Animation

- Patented Technology

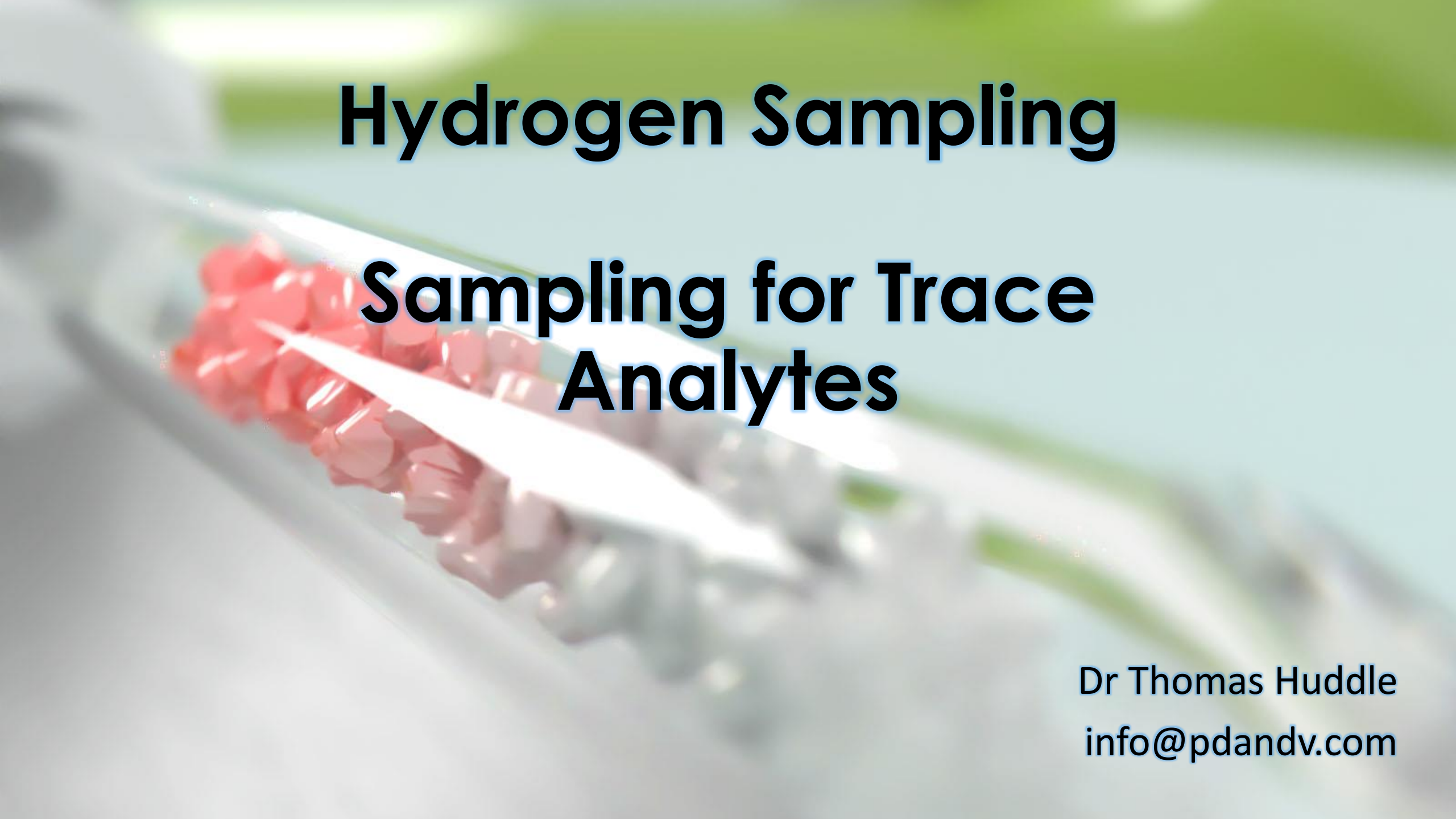
www.vetechnologysampling.com/patents.html

Sampling Good Practice

- Use of Filters can seriously affect sampling of Trace Analytes
- Minimise Sampling Volume
- Eliminate Threads, Dead spaces, Stagnant/Recirculation Regions
- Maintain a Uniform Sampling Pathway
- Electropolish and use Inert Coatings
- Minimise Components and keep the Design simple

Conclusions

- Stringent control of Trace Analytes is required for efficient use of Biomethane, Hydrogen for PEM and Catalytic Conversion Processes
- Avoid losing Analytes to poor Sample System design, don’t accept traditional Methods and Products
- Simple Designs yield the most accurate and reproducible results



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