



# JAROSŁAW CHUDZICKI

ESR4: EFFECTS OF TEMPERATURE AND STOICHIOMETRIC OXYGEN ON THE MINERALISATION OF P-RICH ORGANIC BIOSOLIDS

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## Research goals and focus:

- The aim of ESR4 is to collect dairy processing waste (DPW) samples from dairies and characterize their fuel properties.
- Investigate effects of temperature and stoichiometric oxygen on C content and phosphorous speciation during incineration of DPW sludge using thermogravimetric analysis and controlled fixed bed thermal oxidizers.
- Undertake trials of DPW biosolids in a 250kW bubbling fluidized bed (up to 900°C). Analyze ash from the bed, cyclone, and baghouse filter and for phosphorous species and contaminant heavy metals. Undertake carbon, ash and P mass balance.
- Determine composition of mineral fraction and proportion of organic P, inorganic P, and apatite P.
- Thermodynamic equilibrium modeling using Factsage and empirical data to predict the gaseous and particulate inorganic species liberated during incineration of DPW and their subsequent reactions downstream of the combustor.

**Expected results:** Report of low temperature incineration of DPW biosolids producing a mineral ash. Thorough characterisation of P speciation and heavy metal partitioning with the FBC unit processes. Thermodynamic equilibrium model of P mineralisation and heavy metal partitioning as a function of temperature and stoichiometric oxygen.

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