

# Characterisation of Pyrolysis Products and their Influence in Aluminium Scrap Recycling

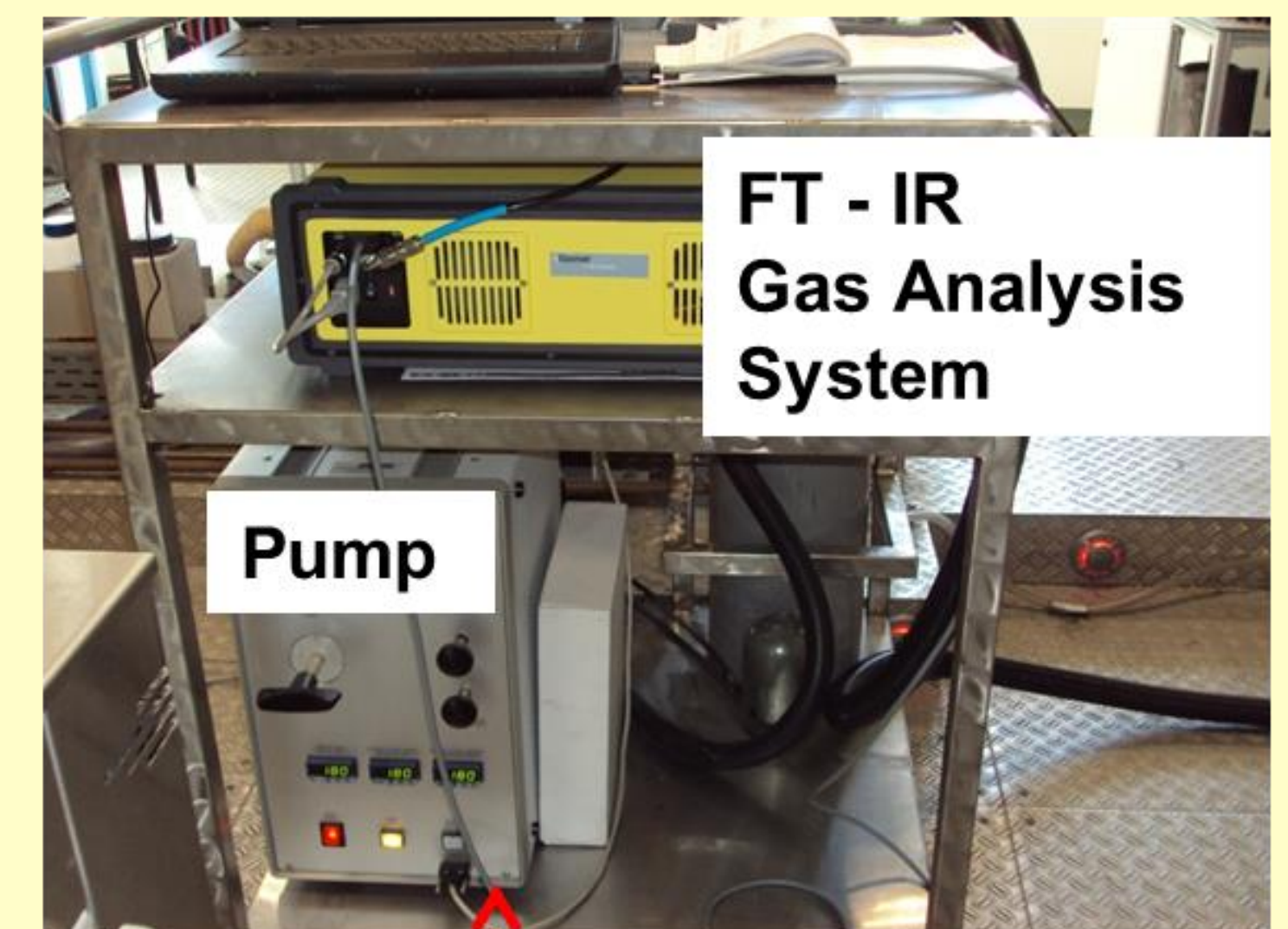
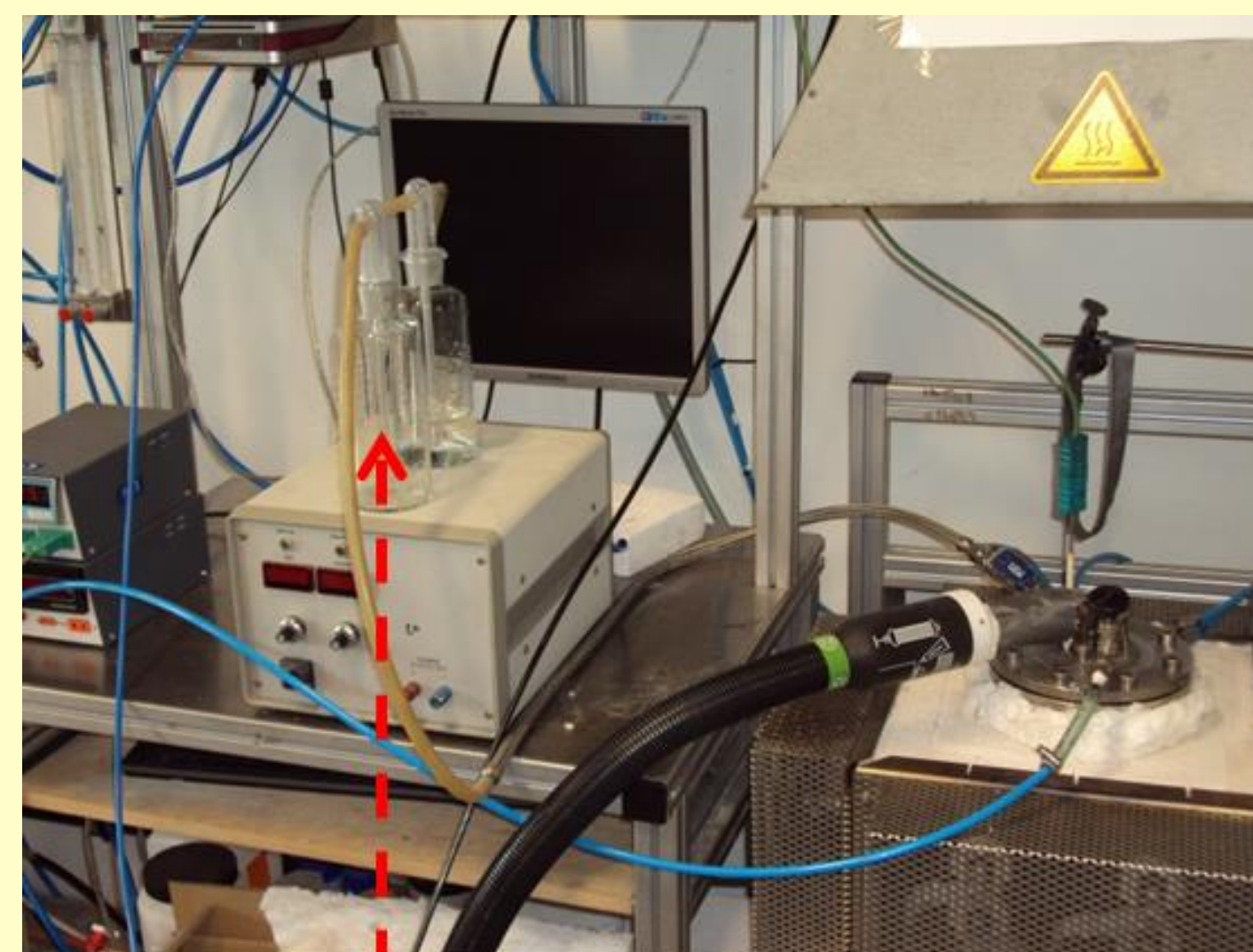
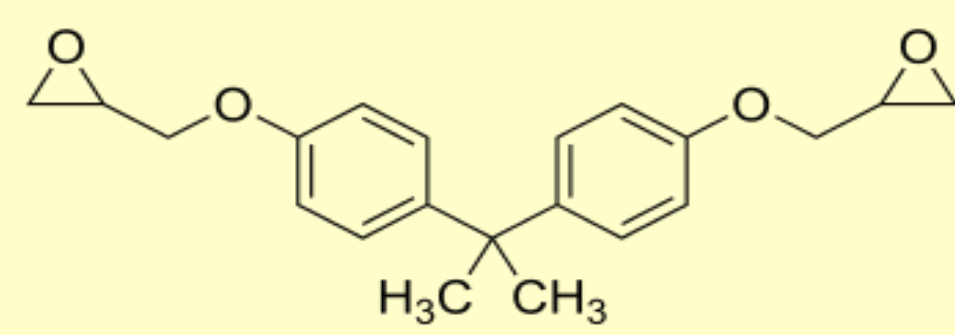
## Motivation:

- Determination of the influence of pyrolysis- and combustion gases on dross formation using organic coating aluminium scrap
- Development of a mechanism model for the de-coating process focusing on gaseous reaction products according to the gas evolution
- Assessment of the gas - liquid interactions



UBC bale with a organic amount of 2-3%

Typical varnish component:  
Bisphenol-A-diglycidylether  
(epoxy resin)



## Composition of Used Beverage Cans (UBC):

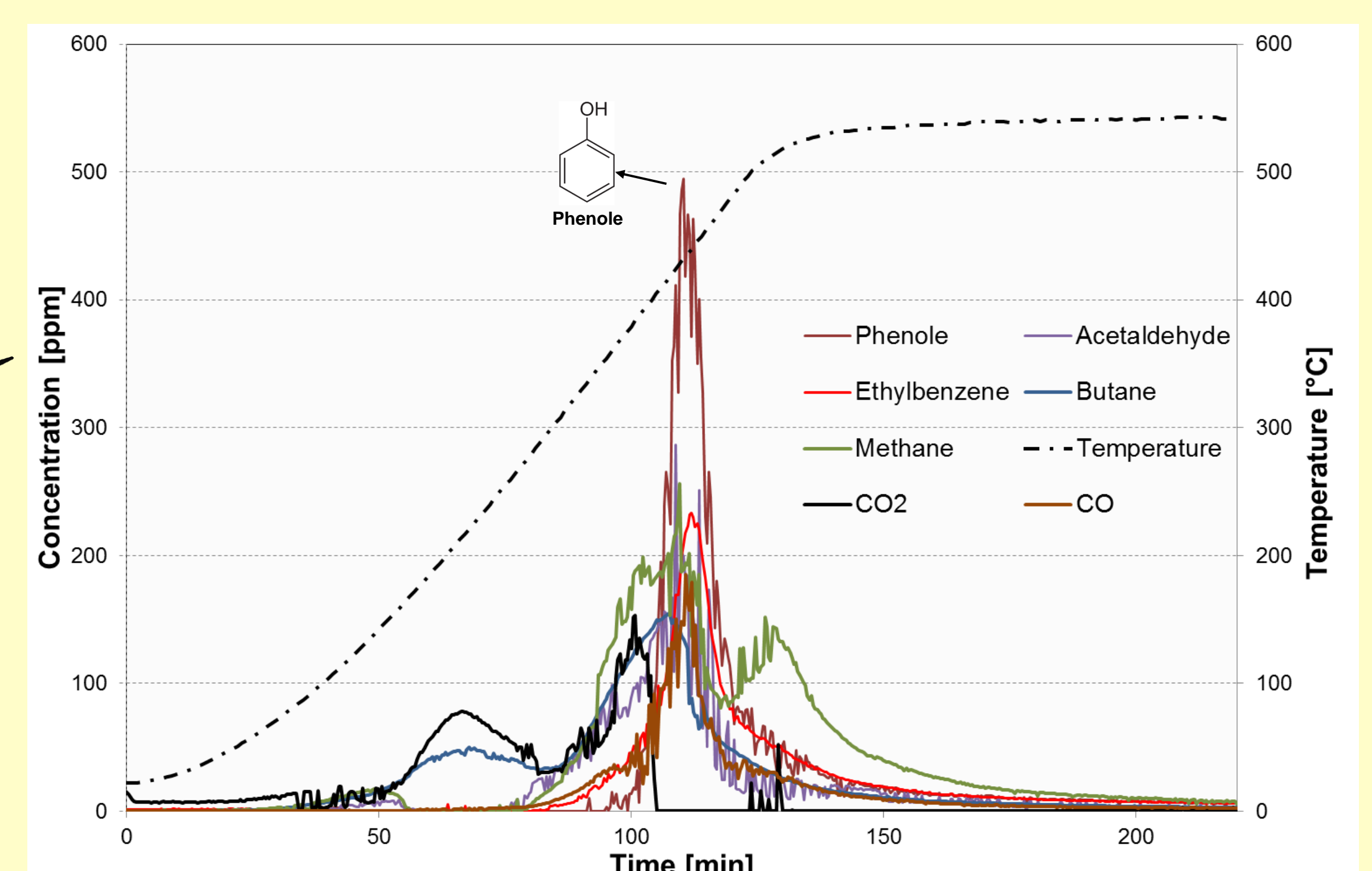
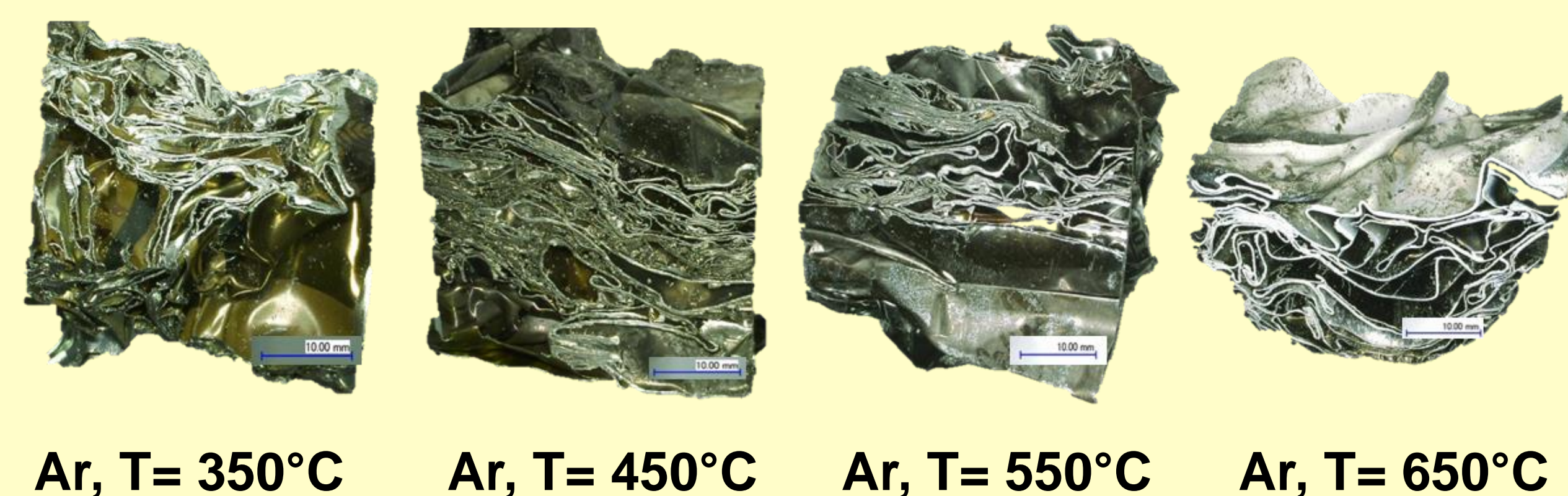
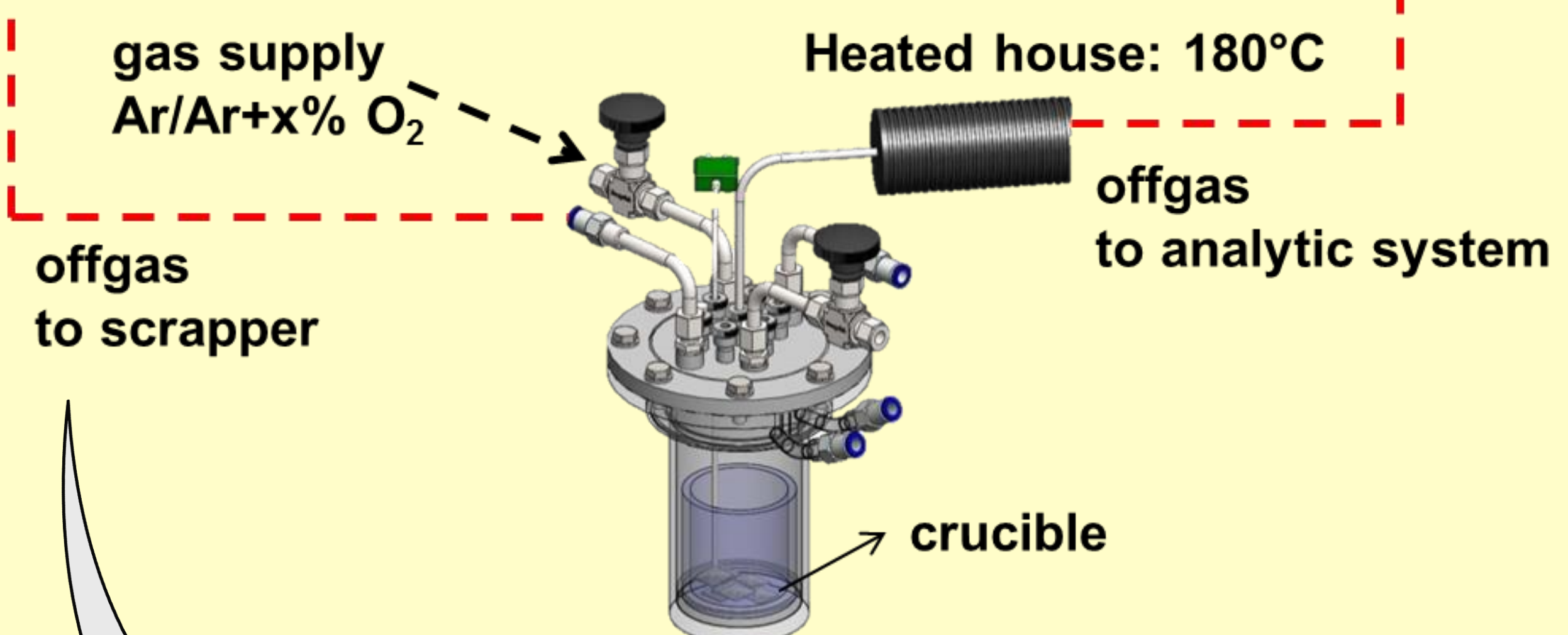
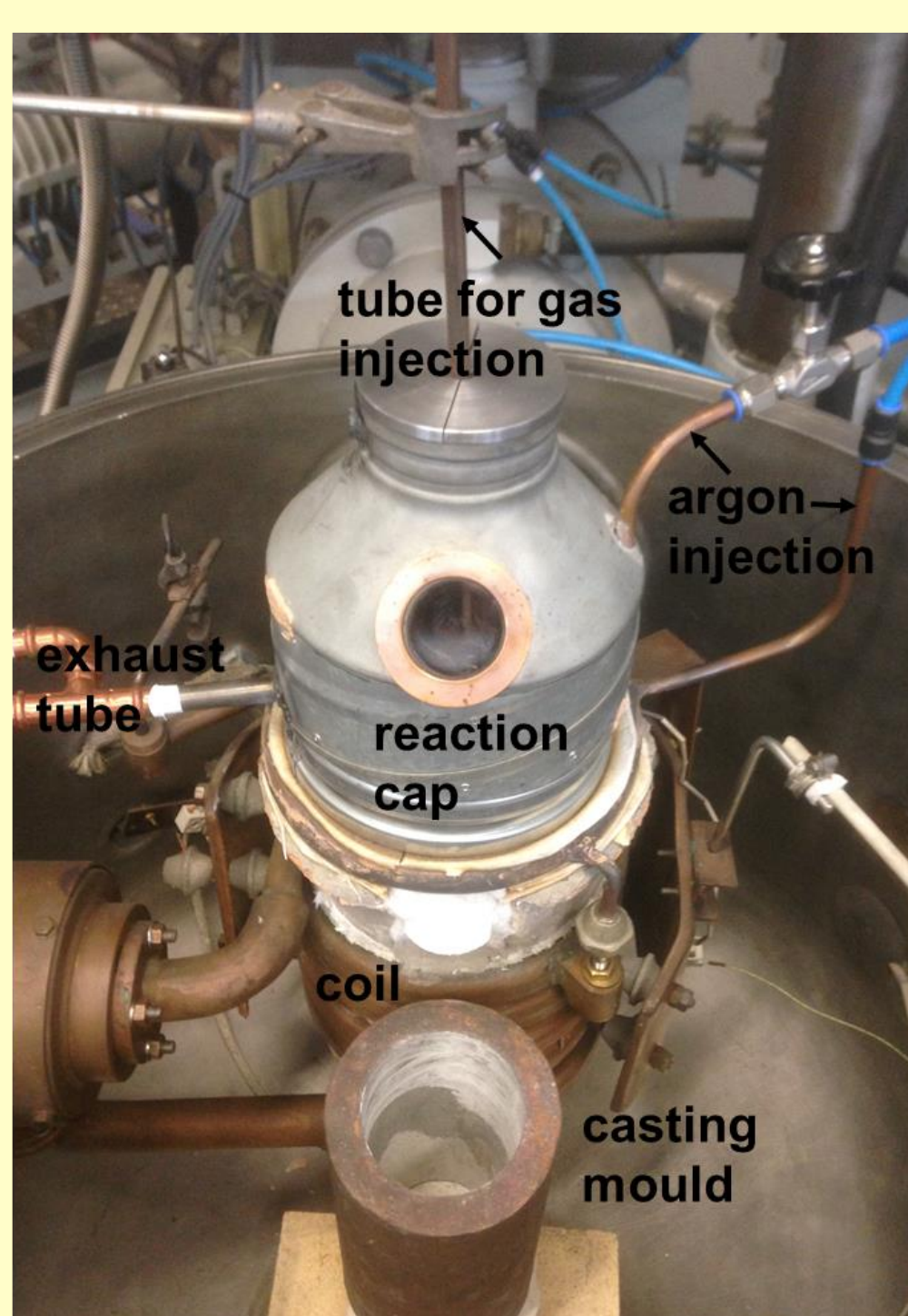
- Can lid: 5182 alloy, can body: 3104 alloy
- Organic layer based on epoxy resin
- Organic coating thickness in the range of 8-12  $\mu\text{m}$

## Thermal treatment (Pyrolysis, Thermolysis)

- Trials in a lab-scale pyrolysis reactor
- Thermal treatment of small UBC pieces (4x3x3 [cm])
- Parameters of influence (time, temperature, heating rate, oxygen)
- Characterization of the pyrolysed products: evolved gas and solid carbon residue

## Interaction pyrolysis gases - aluminum melt

- Injection of synthetic gas mixture (carrier gas: Ar) in Al melt
- Composition of gas mixture is defined by previous characterisation of pyrolysed gas



chemical composition of the evolved gas during a pyrolysis test with max. temp. of 550°C

## Outlook:

- Experimental validation in technical scale by treating industrial UBC bale (inert and enriched oxygen atmosphere)
- Determination of oxidative effect of gaseous pyrolysis products on dross formation