



arvi

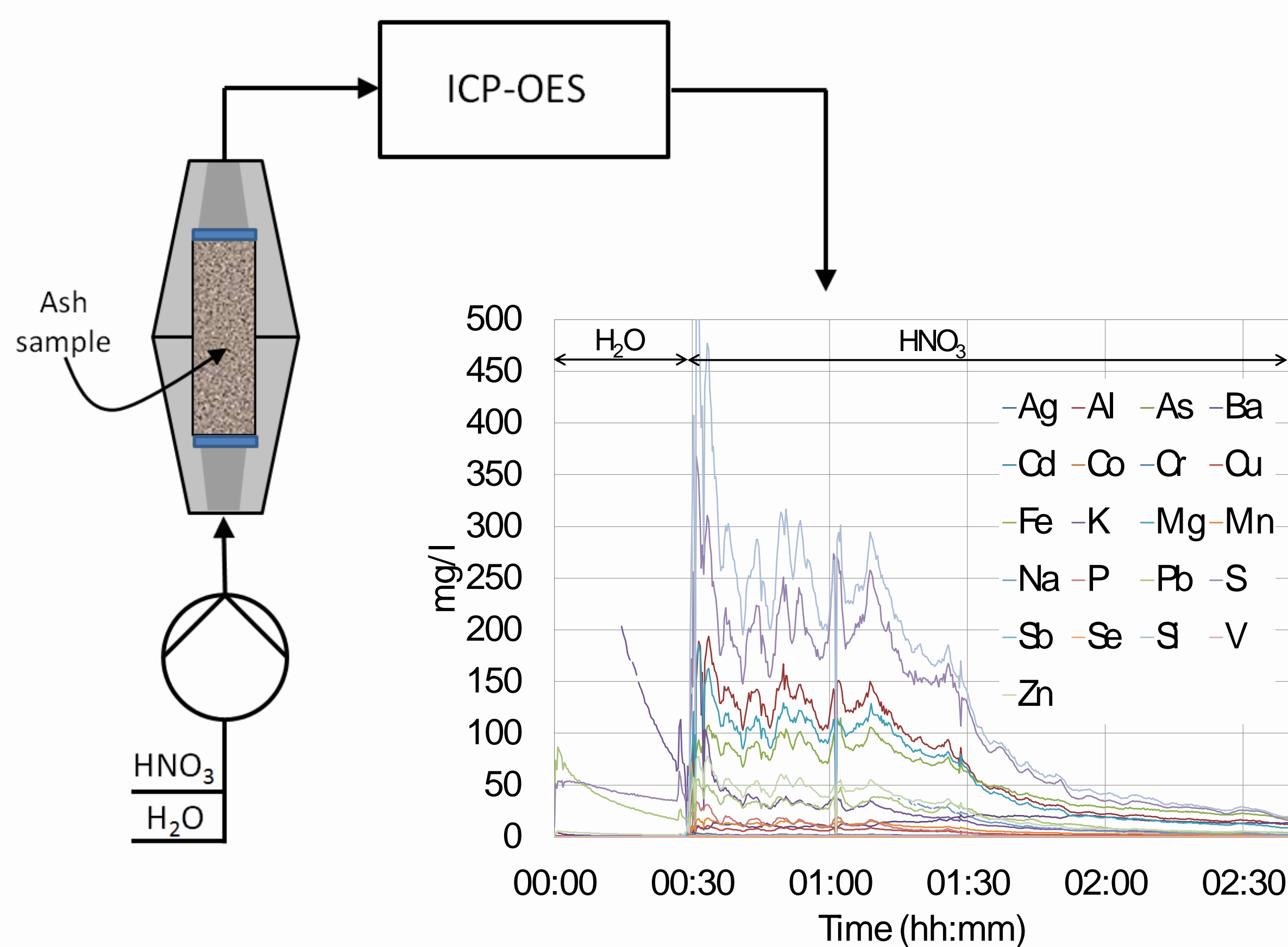
Material Value Chains

Continuous Leaching and Analysis of Ashes

Emil Vainio, Daniel Lindberg, Patrik Yrjas

Johan Gadolin Process Chemistry Centre, Åbo Akademi University

Leaching procedure



0.50 g ash

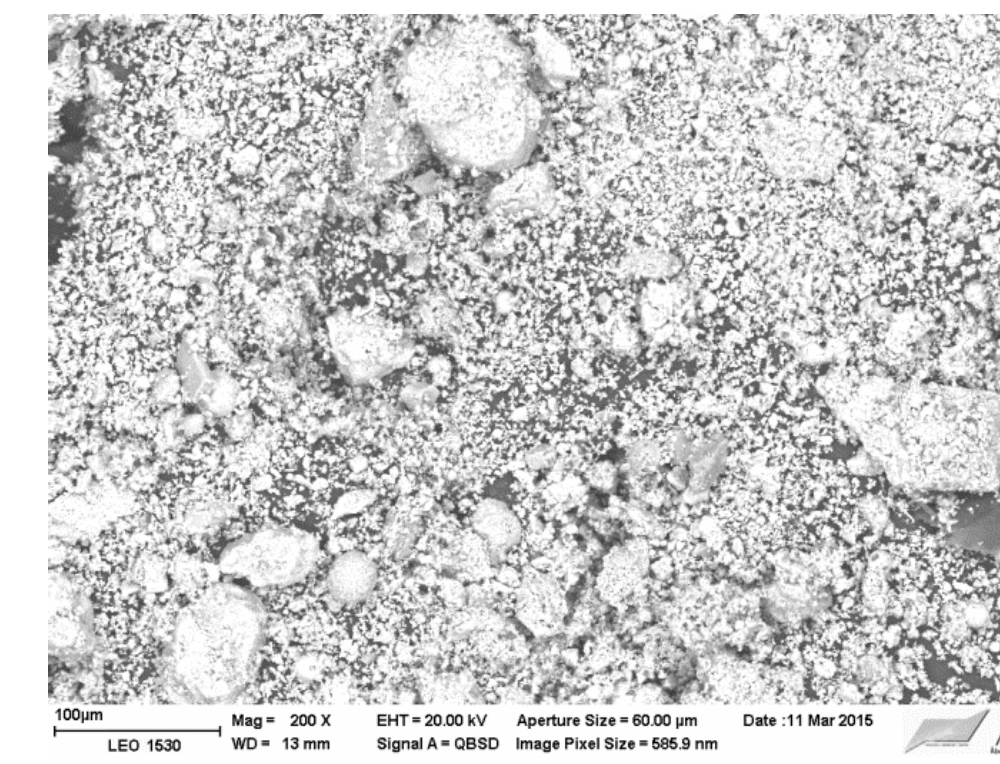
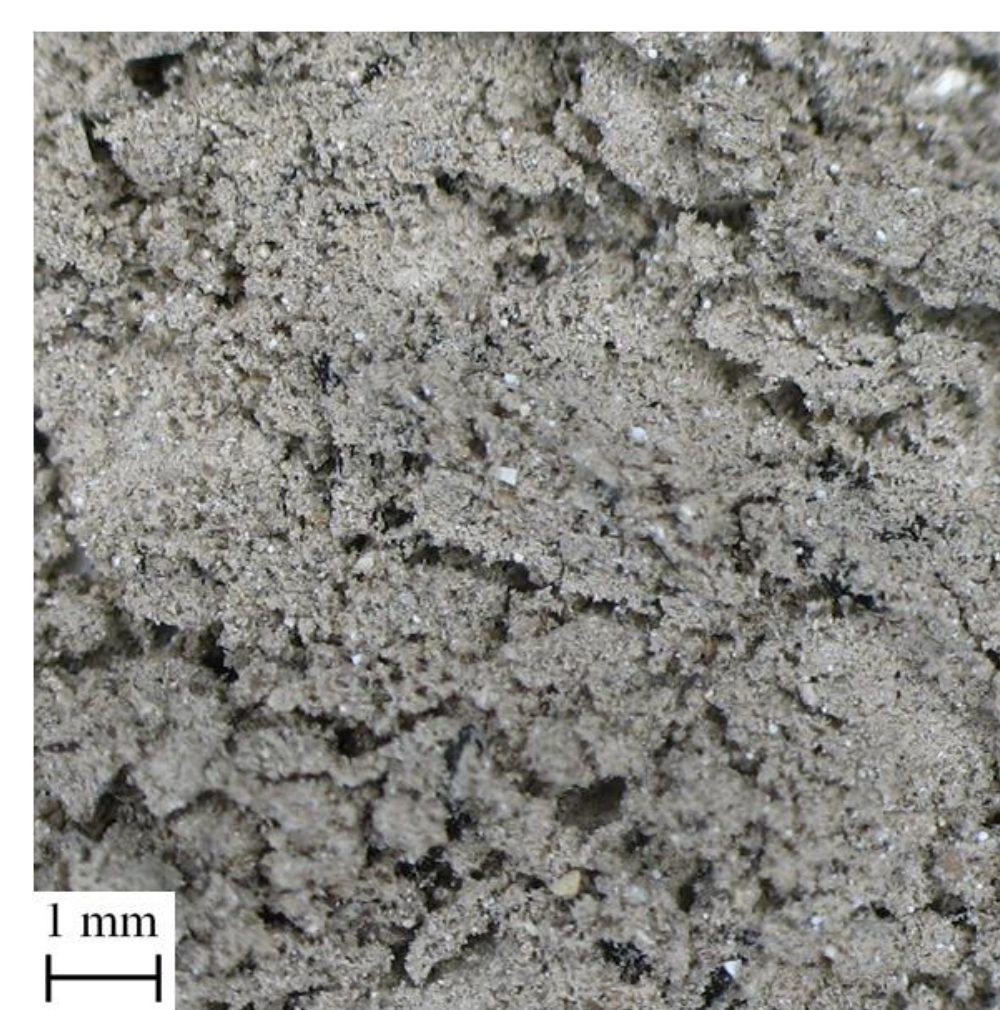
Flow through the ash: 0.6 ml/min

Solvents: water first 30 min and then 5% HNO₃

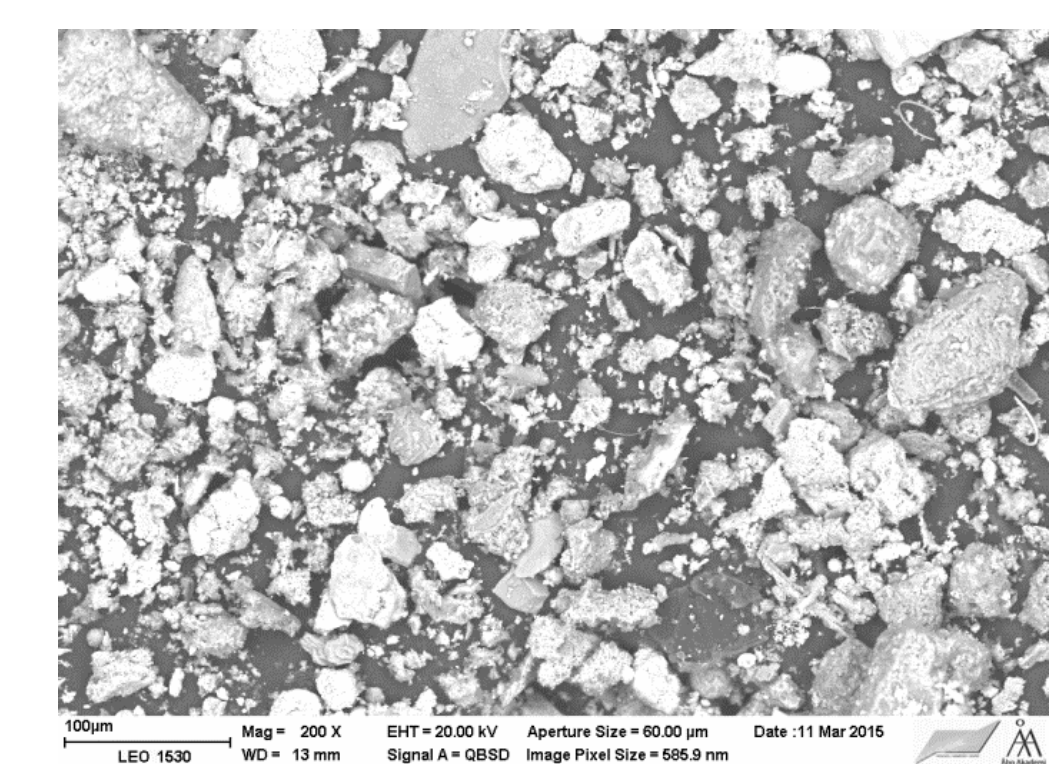
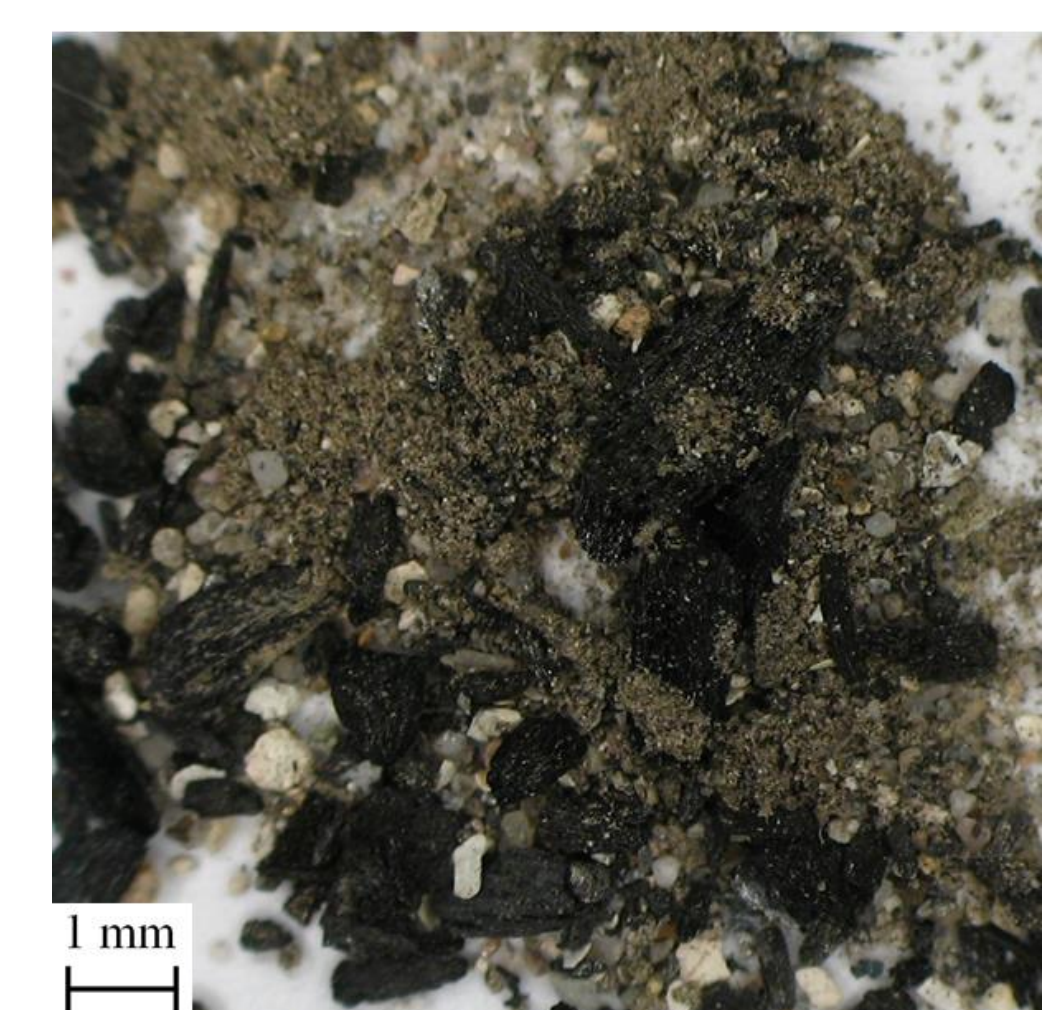
Analysis every 16 s

Elements analyzed: Ag, Al, As, Ba, Ca, Cd, **Co**, Cr, **Cu**, Fe, K, Mg, Mn, Na, P, Pb, S, **Sb**, Se, Si, V, Zn

CFB ash before leaching



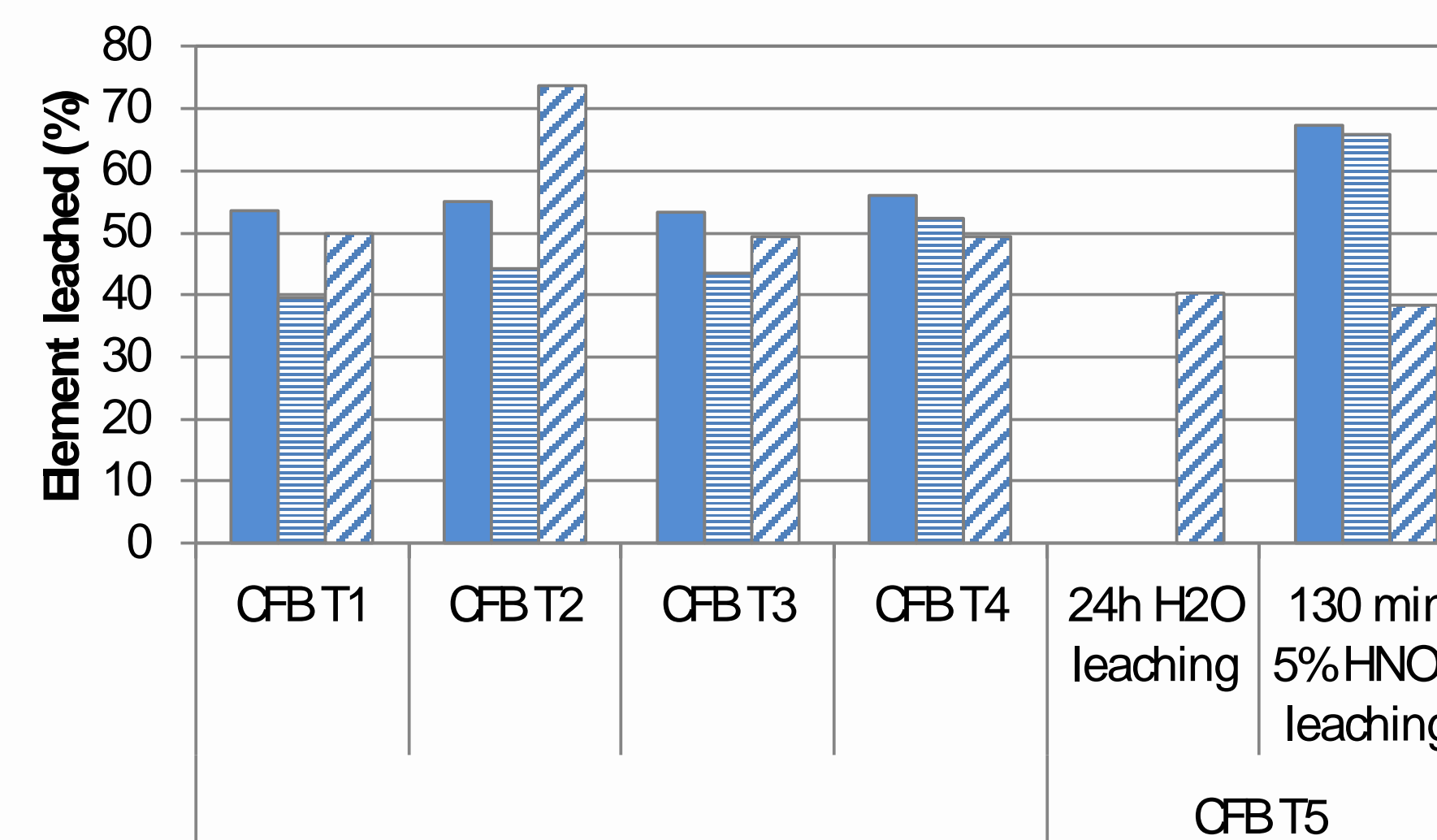
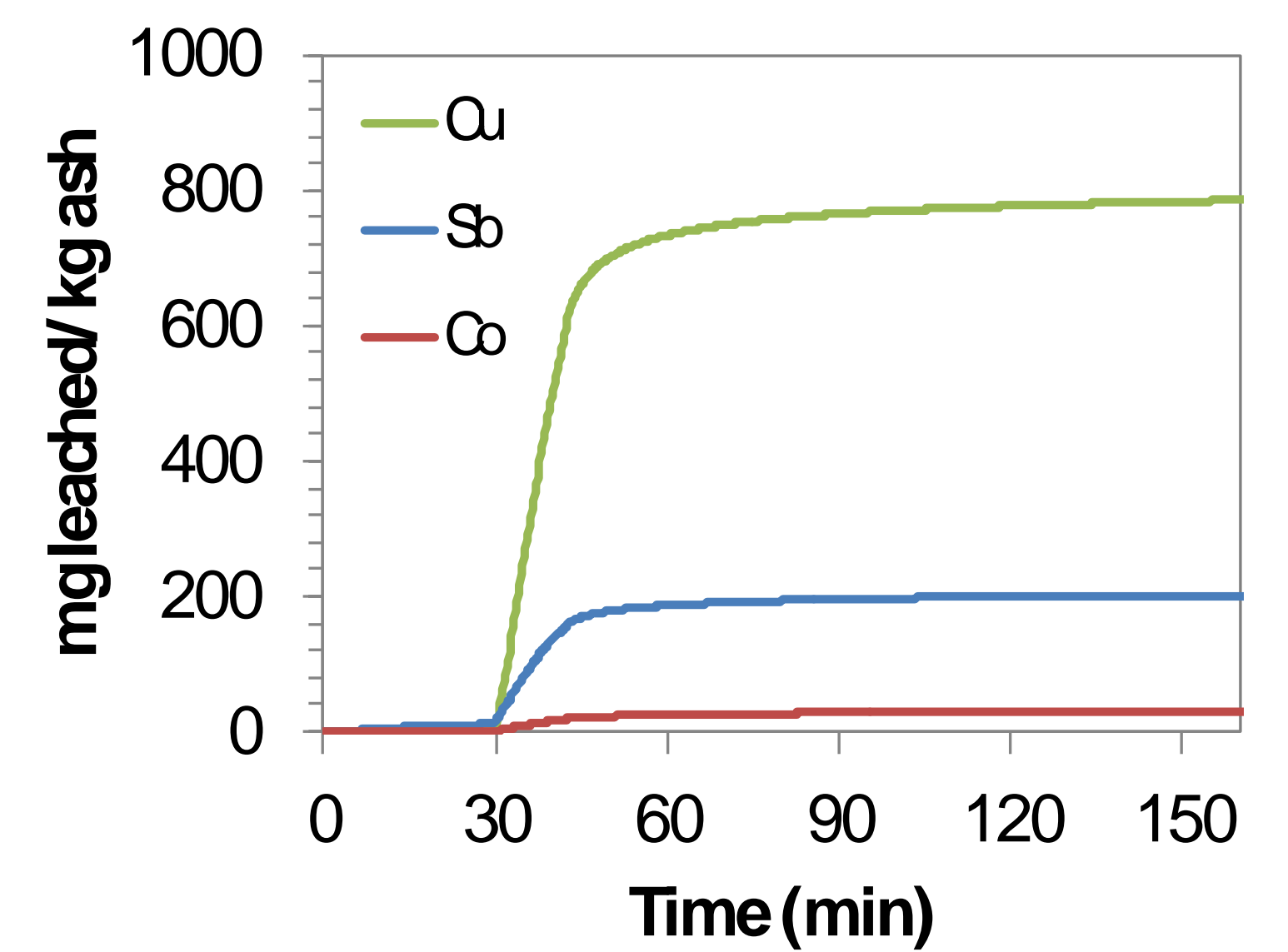
CFB ash after leaching



Results

Typical leaching curves leaching first 30 min with H₂O and then with 5% HNO₃.

- Only some Sb is leached with H₂O
- Leaching rate fast during first 15 min with HNO₃



- HNO₃ leaching stage enhanced by using first a longer (24h) water leaching stage
- 40% of Sb was leached during the 24h water leaching, but no Co or Cu

Ashes tested in the project

Ash (T1-T5 = cyclone temp.)	Cu (mg/kg)	Co (mg/kg)	Sb (mg/kg)
BFB1 baghouse ash	426	20	27
BFB2 baghouse ash	2170	30	173
CFB ESP ash	1410	29	135
CFB T1 (650°C)	990	48	390
CFB T2 (650°C)	1200	51	350
CFB T3 (600°C)	1400	53	400
CFB T4 (500°C)	1500	54	400
CFB T5 (450°C)	1400	52	370

Conclusions

A continuous leaching method was set up to study the leaching behavior of ashes, with the main focus on Co, Cu, and Sb. The method can be used to find optimal parameters for leaching various elements.



Solution Architect for Global
Bioeconomy & Cleantech Opportunities

