Solar Recycling of Secondary Zinc Residues (Waelz Oxide)

Waelz Process

- Recovery of Zn from Electric Arc Furnace (EAF) dusts:
  - Nearly 1 Mio t/a of „Waelz oxide (WOX)“ produced
- Most problematic elements for further processing: Pb and Cl
- State of the art:
  - Washing and recycling of washed WOX for *Zn metal production*

Waelz oxide (WOX)

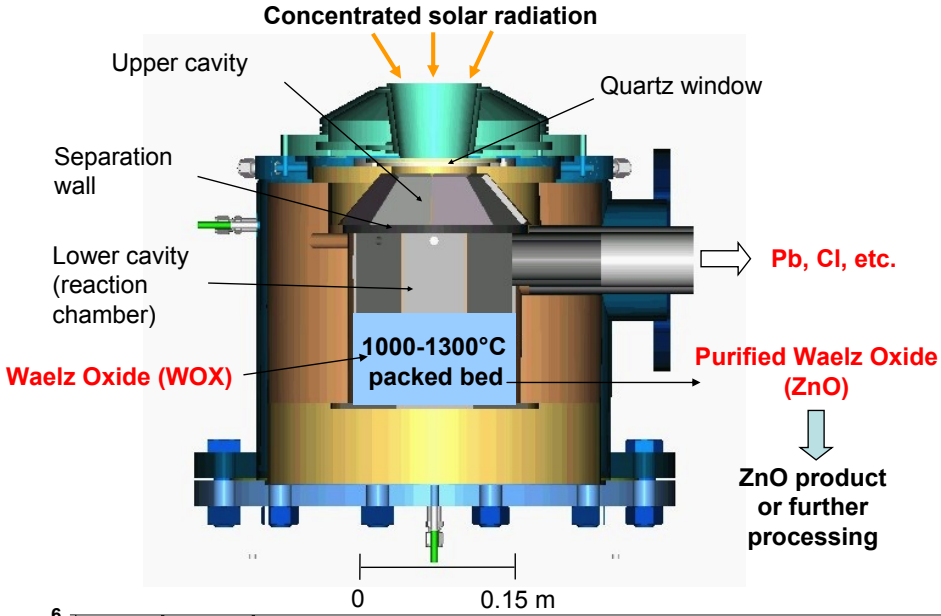
WOX	Weight %
Zn	62
Pb	4
Cl	5
Fe	2
C	1
K	3
Na	2
S	0.5
F	0.1

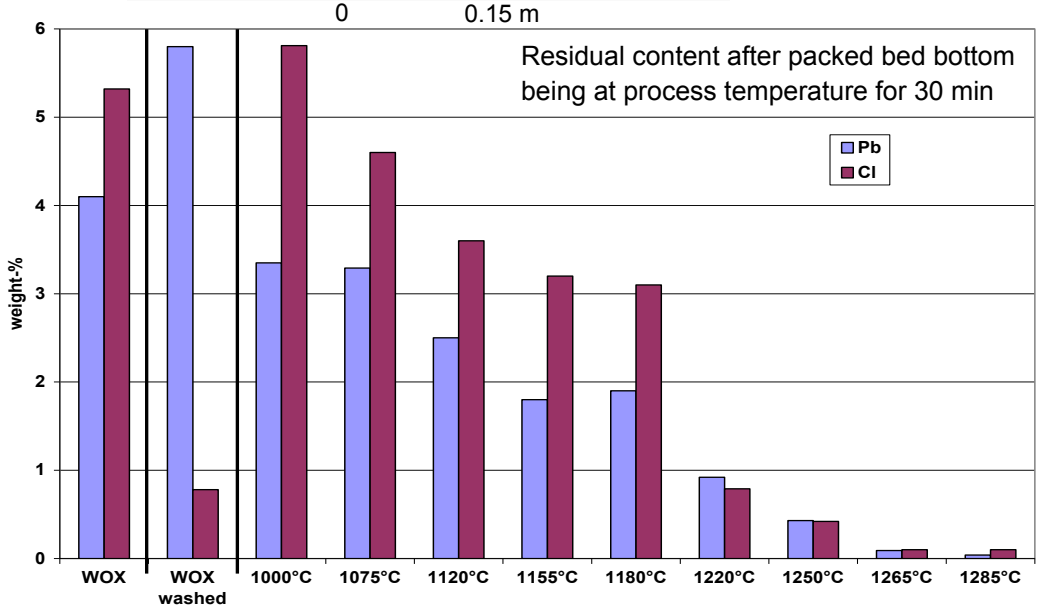
New Solar Concept for Waelz Oxide recycling

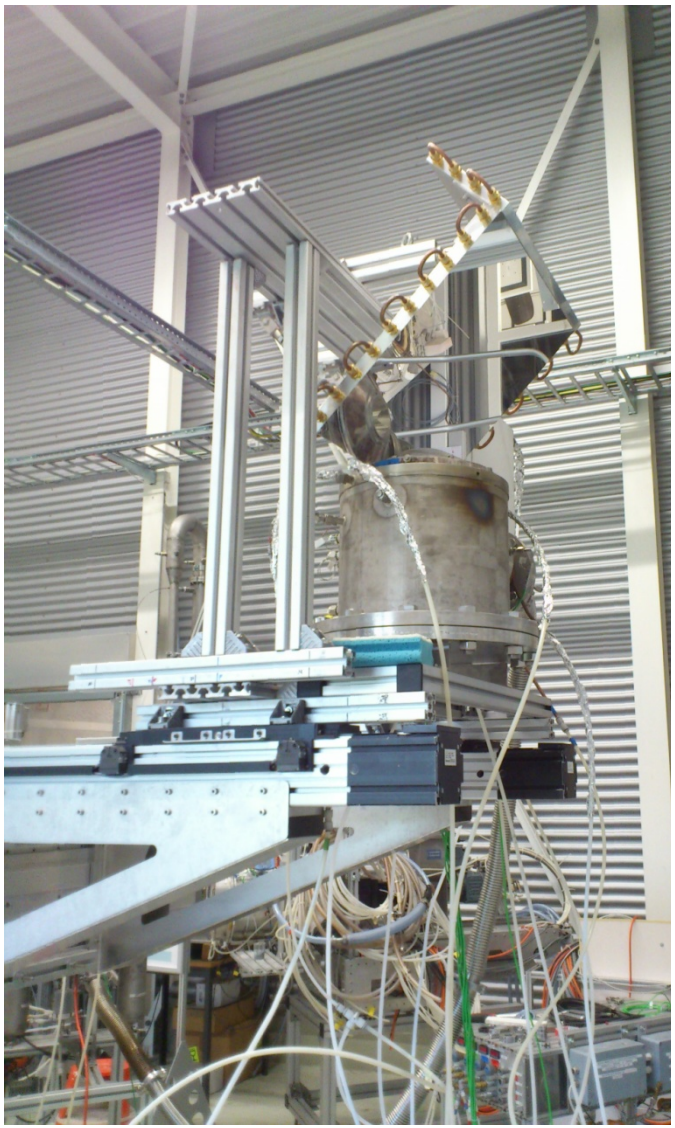
- Thermal purification and carbothermic production of *specific Zn and ZnO products* using concentrated solar radiation
- Achievements:
  - Lab-scale tests with 5 kW „two-cavity solar reactor“ at PSI’s High-Flux Solar Simulator
  - Successful solar purification of WOX to residual Cl- and Pb- content < 0.1%
  - Successful solar carbothermic reduction of purified WOX for Zn(g)-generation
- Further information:
  N. Tzouganatos et al, TMS-Journal of Metals, Vol. 65, Dec. 2013

Partners (lab scale tests 2012/early 2013):
Befesa Steel R&D (Spain/Germany);
Montan University Leoben (Austria)

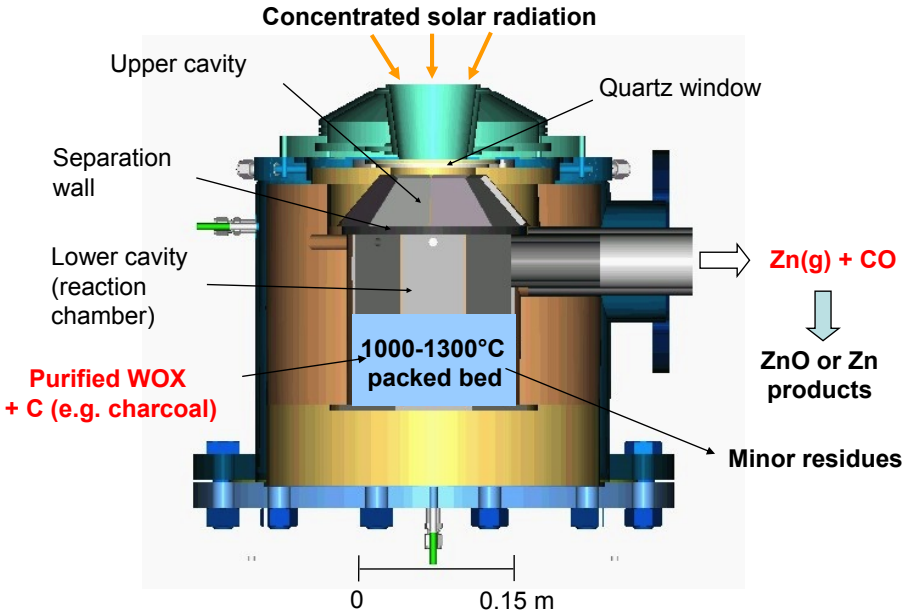
Solar Purification of WOX

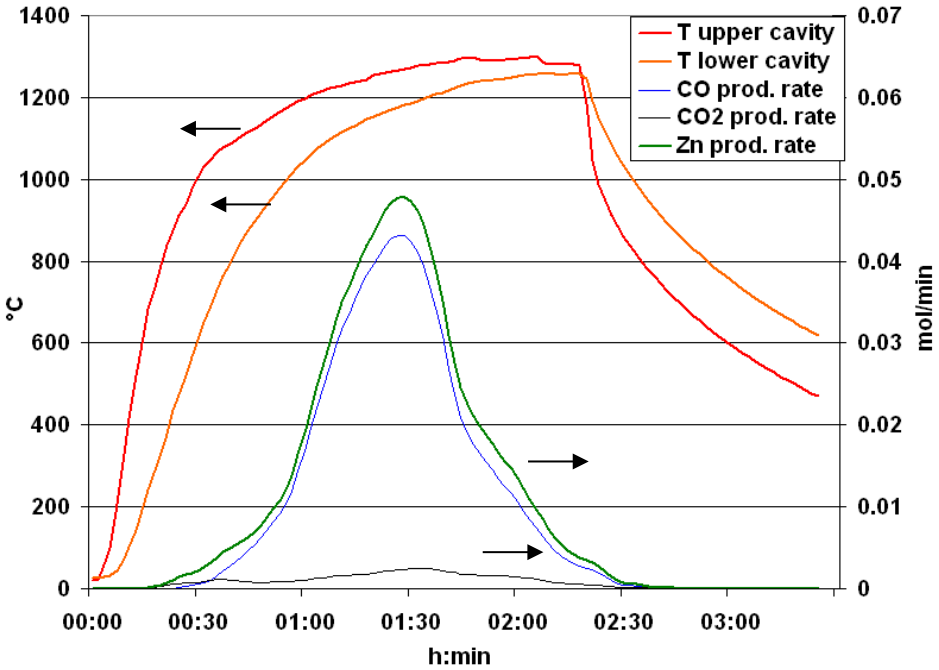






Solar Carbothermic Production of Zinc





- Typical input into 5 kW solar reactor:
  - 240 g purified WOX + 32 g beech charcoal
- Zn production rate derived from measured CO and CO_2 production rates

- **Conclusion**
  Similar Zn production rate as with solar process $ZnO + C \rightarrow Zn + CO$ demonstrated with 300 kW pilot plant (EU-SOLZINC project)