

Ever Resource

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23rd Int. Lead Conference

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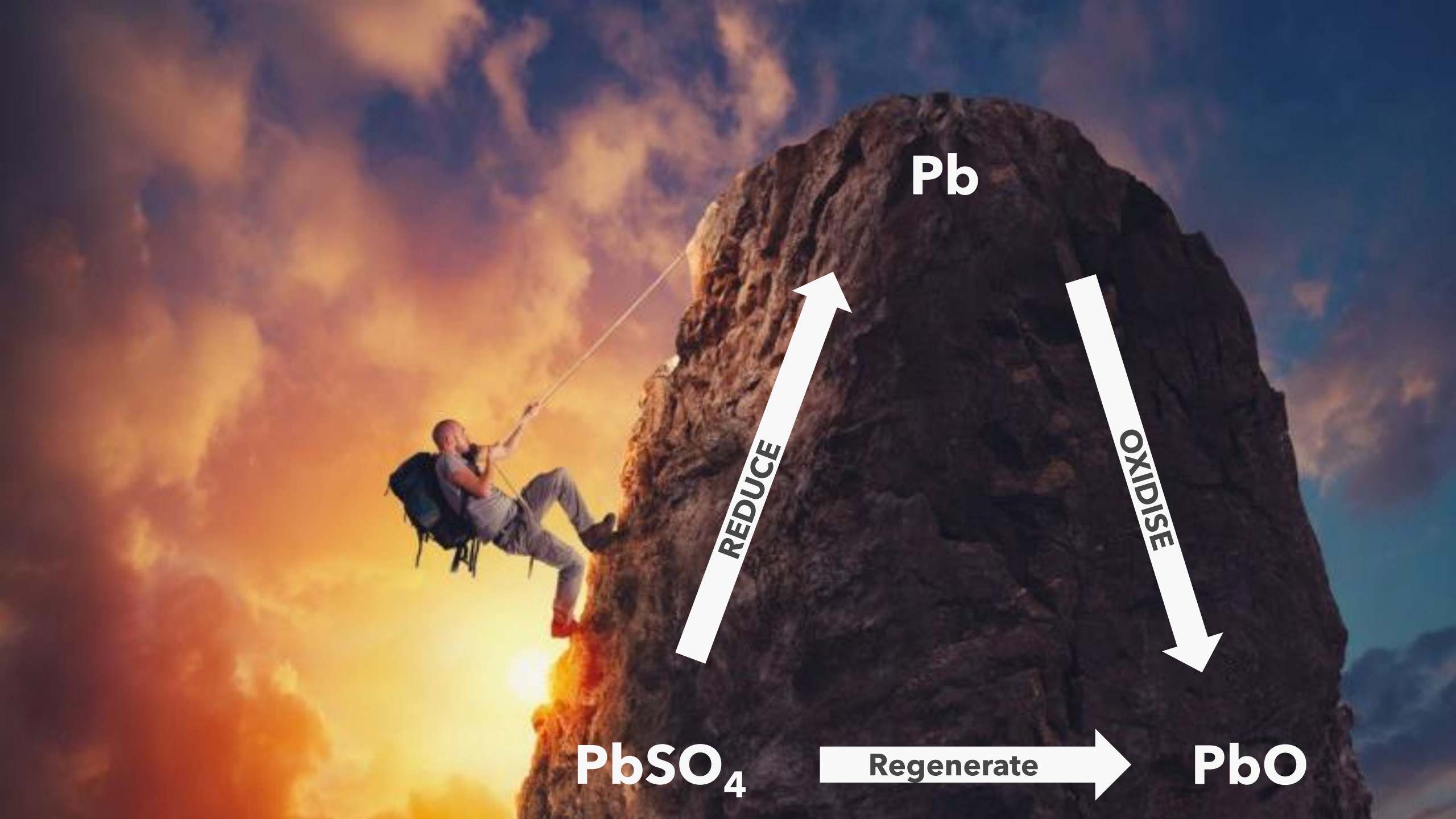




Ever Resource is a circular economy innovator.

We spun out of the University of Cambridge to develop "Regenerate" – a green process for the recycling of spent lead-acid battery paste.





Pb

REDUCE

OXIDISE

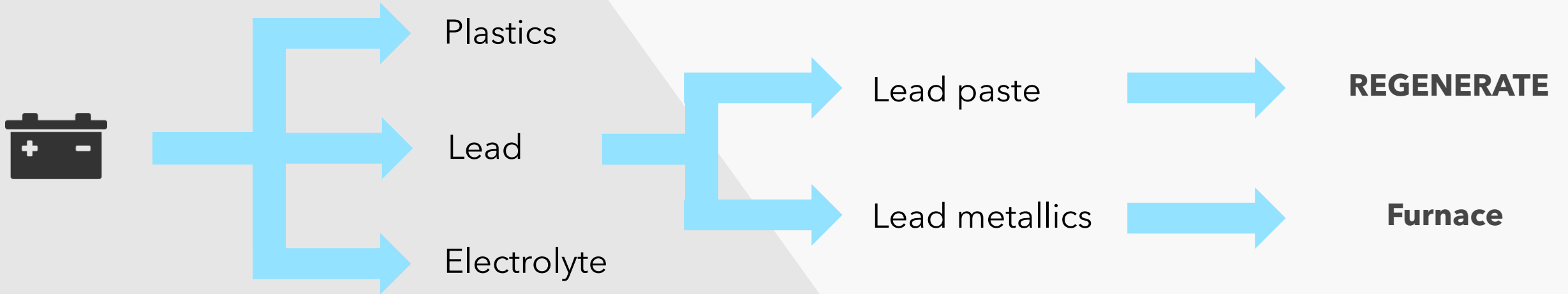
PbSO₄

Regenerate

PbO

The REGENERATE Solution

A hydrometallurgical process to regenerate spent lead battery paste. It starts with battery breaking.



REGENERATE solution

End-of-life paste
(mainly lead sulphate)

i) Optimisation
ii) Citric Acid


ZERO WASTE
[metal-organic framework]

iii) Calcination

leady oxide
(99.99%)

Low energy, zero waste... First stage occurs in a water tank.



Unique Selling Points

1

Emissions: no SOx and Nox. Carbon reduced by an average of 85%.

2

Circular: reduces recycling waste by >90%.

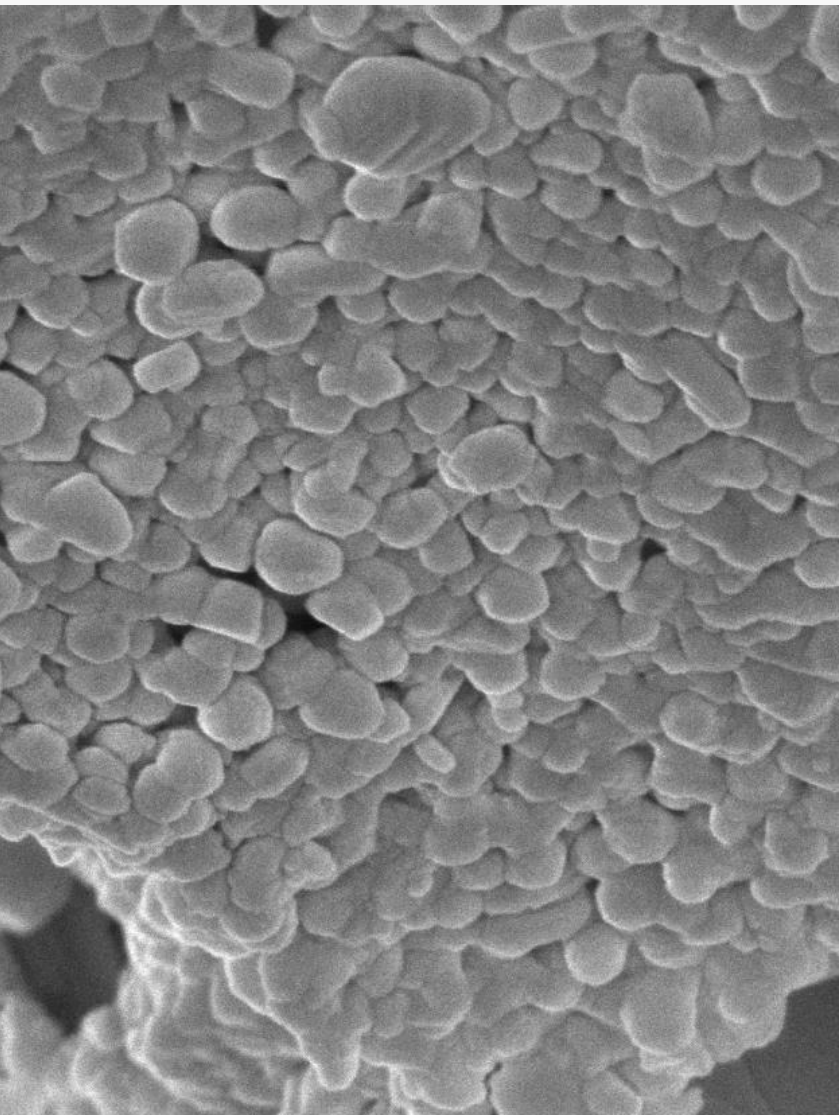
3

Energy: saving equivalent of 3,000 tonnes of coal per 10,000 tonnes batteries.

4

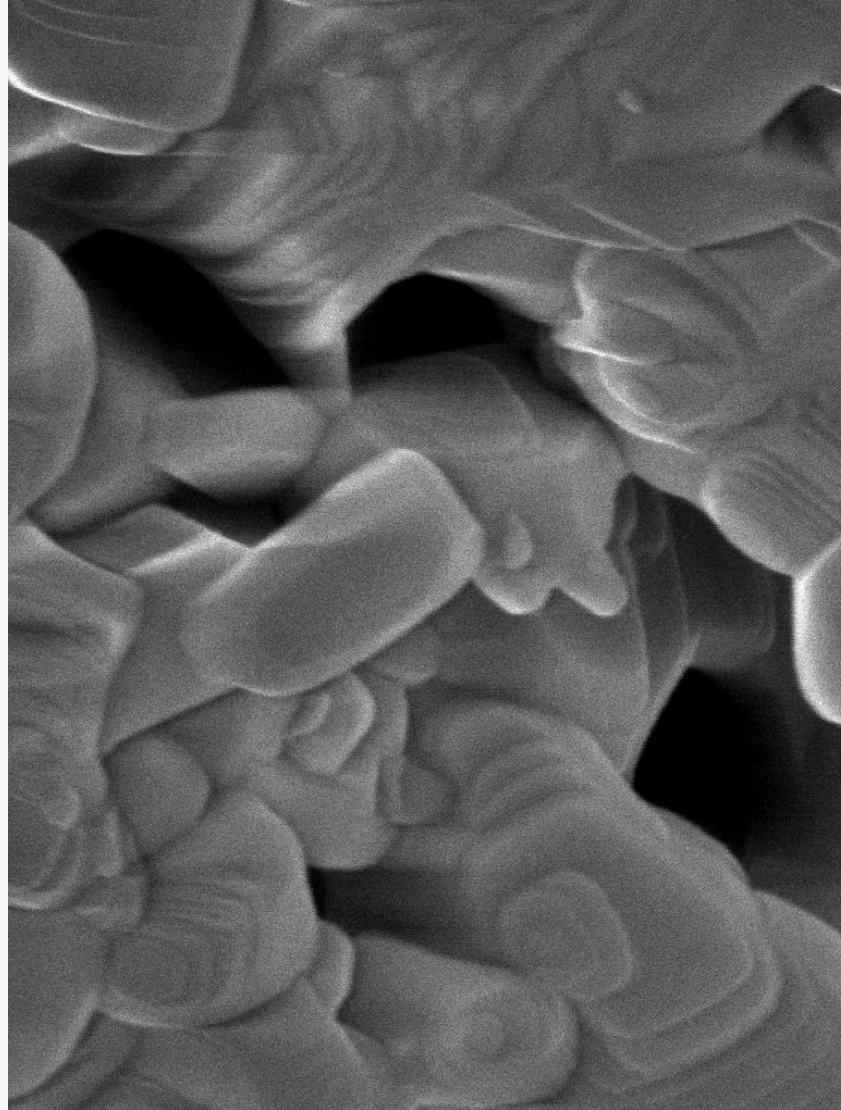
Technology: up to 40% higher energy density. Improves active material utilisation and cycling.

SEM image of
REGENERATE oxide



x: -2.8096 mm
y: 10.1952 mm

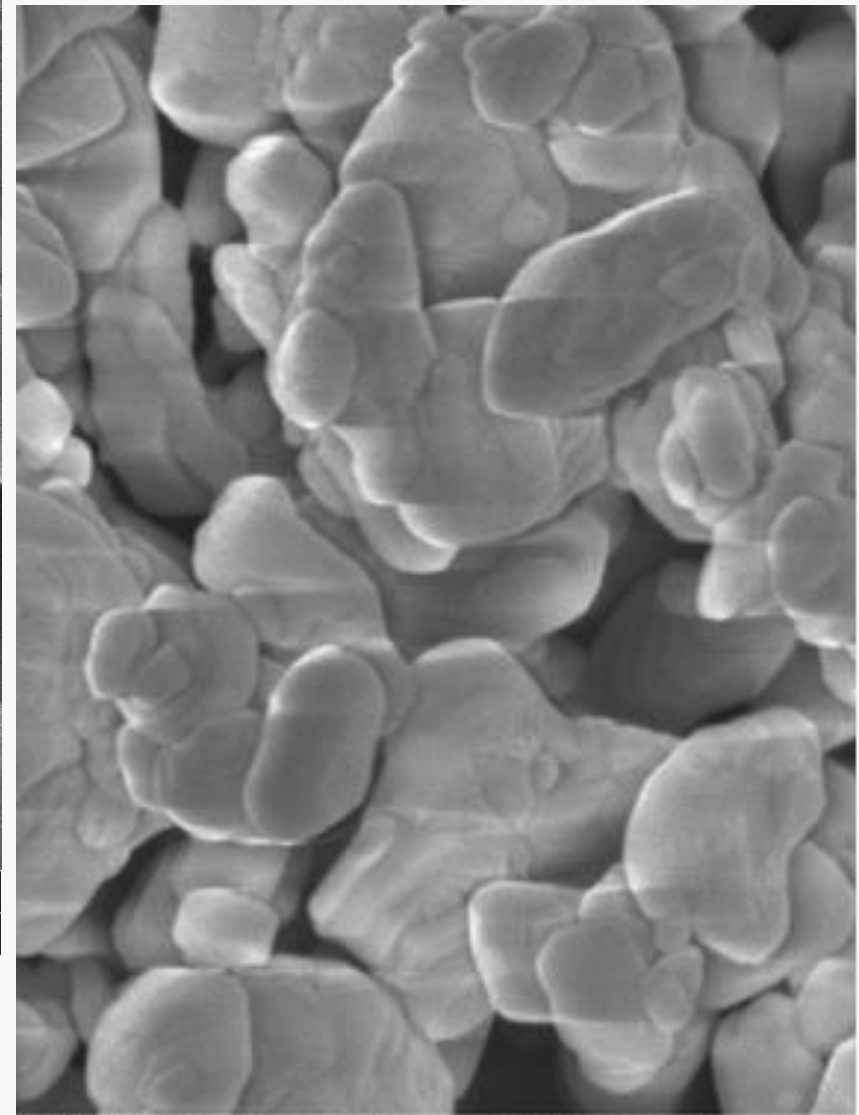
500 nm



x: 4.0588 mm
y: 10.3420 mm

500 nm

SEM image of
Barton pot oxide

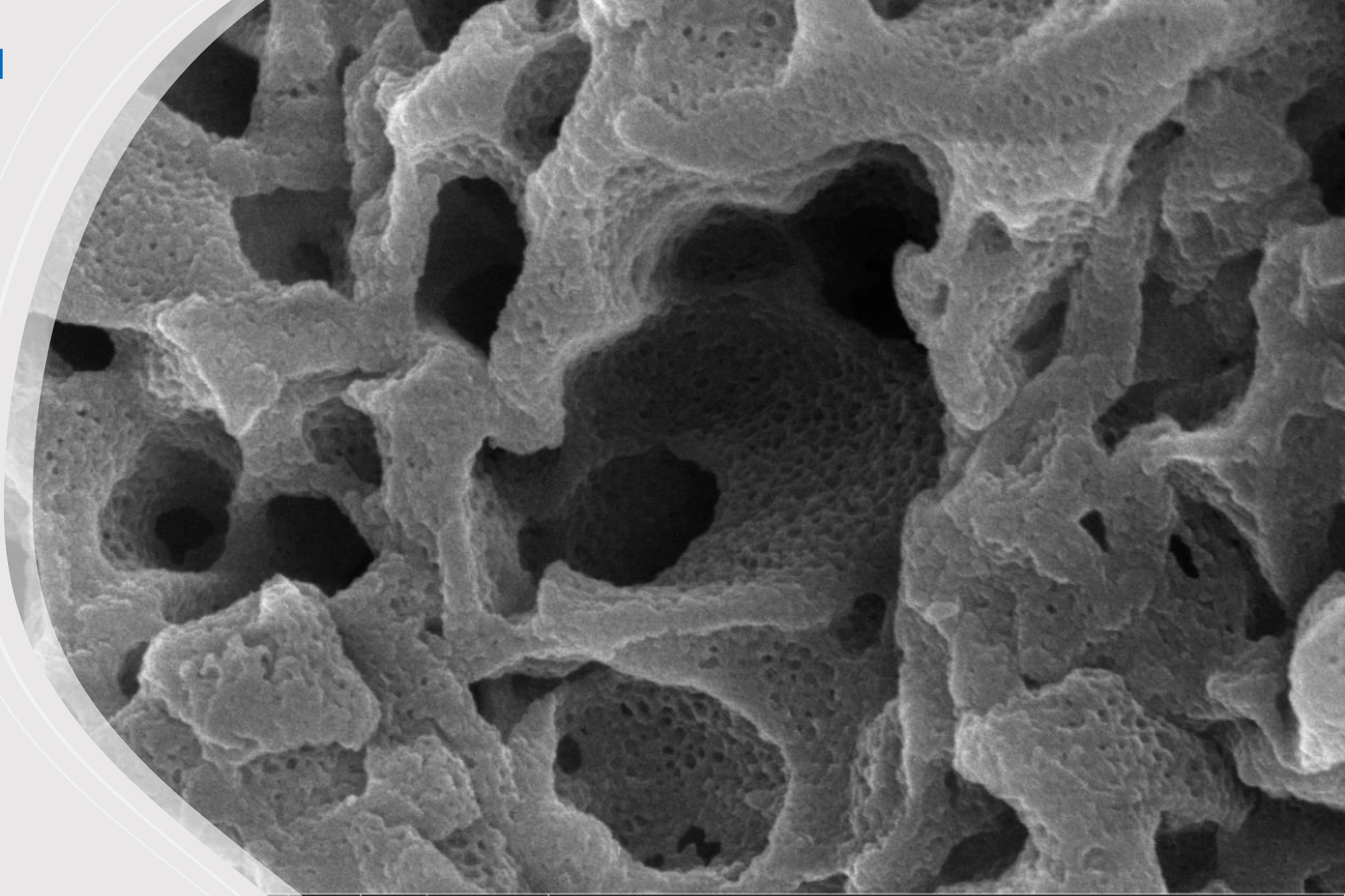


x: -8.8246 mm
y: -5.9818 mm

500 nm

If Barton pot or ball mill oxides are like pebbles...

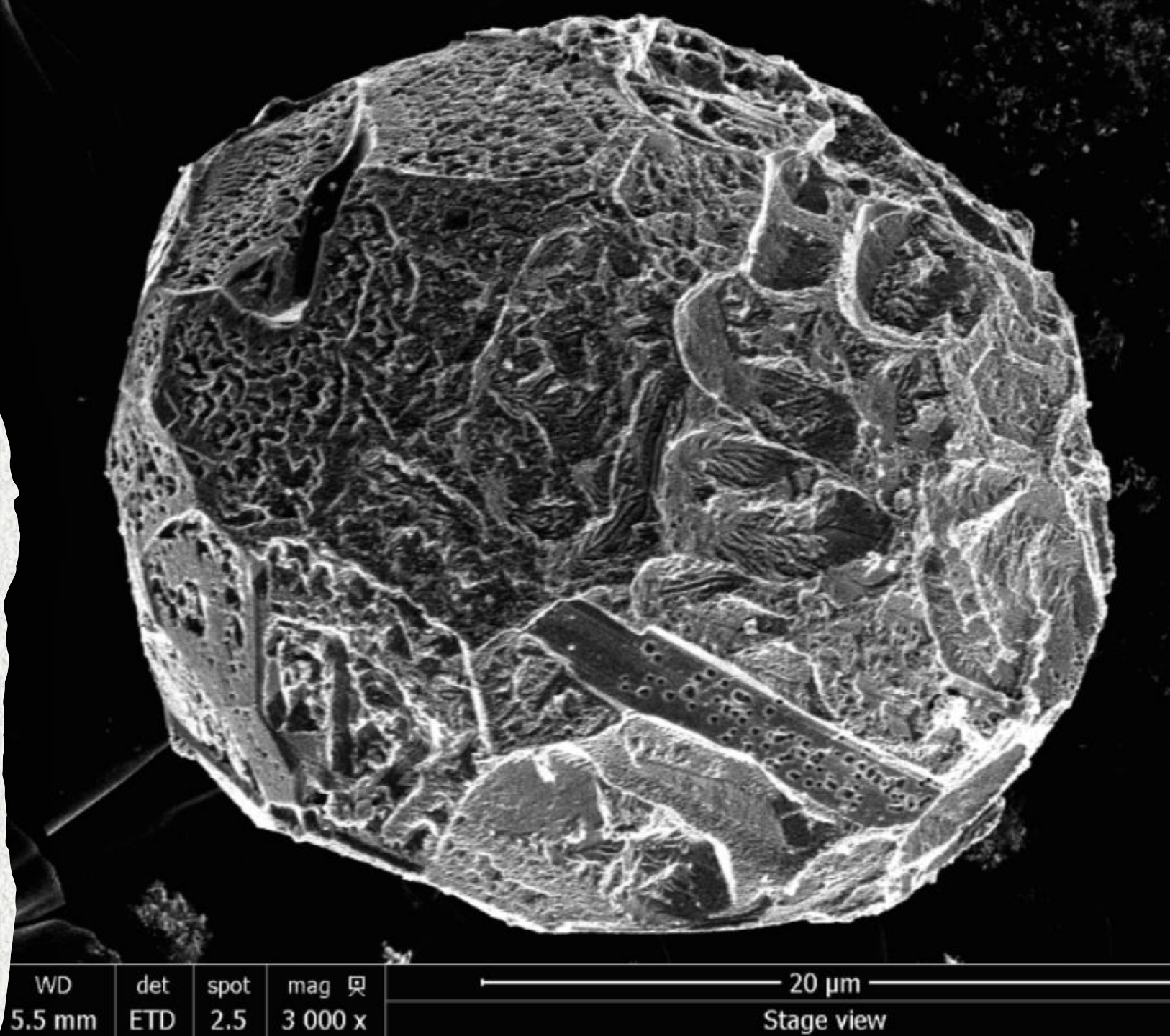
...Regenerate oxides are like a pumice stone.

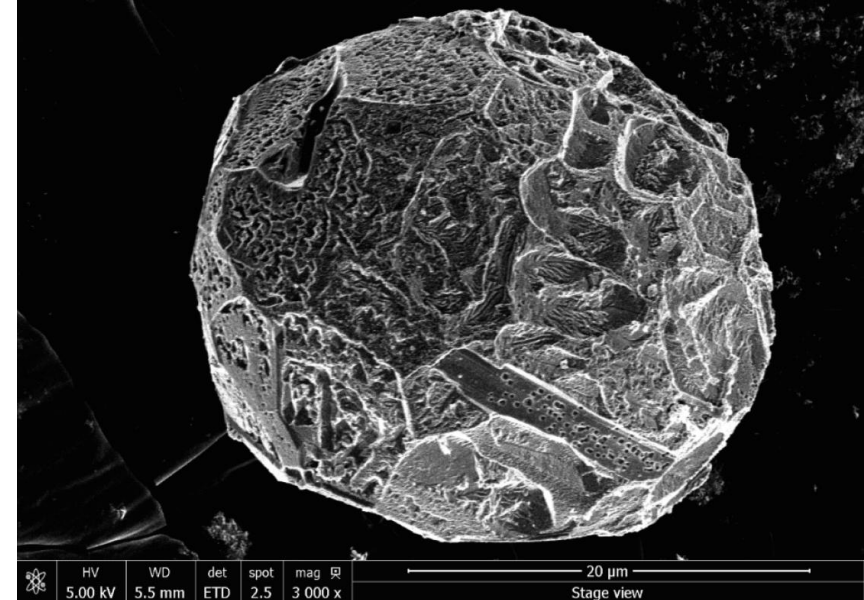
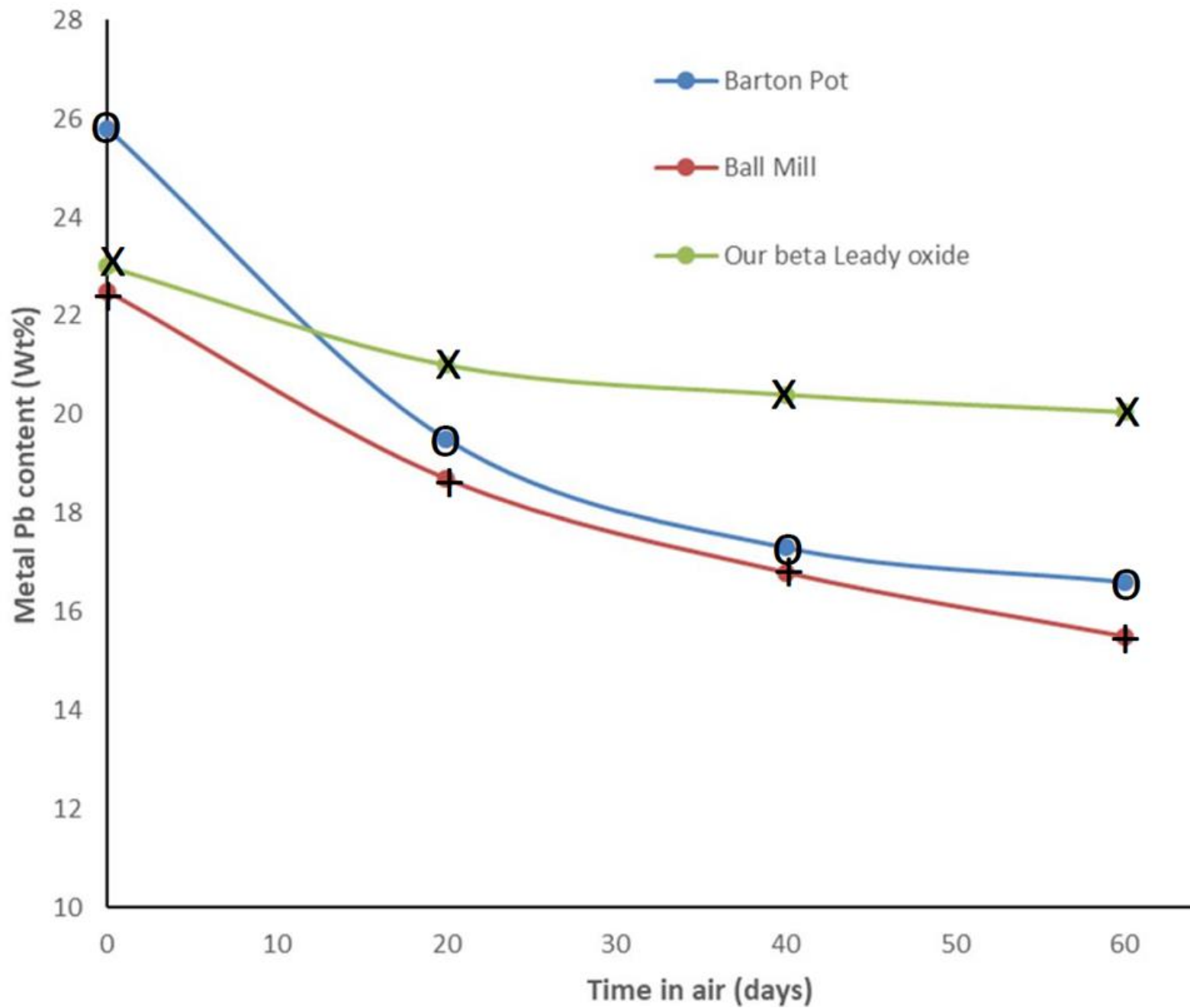


det	spot	mag	1 μm
D	2.5	50 000 x	Stage view

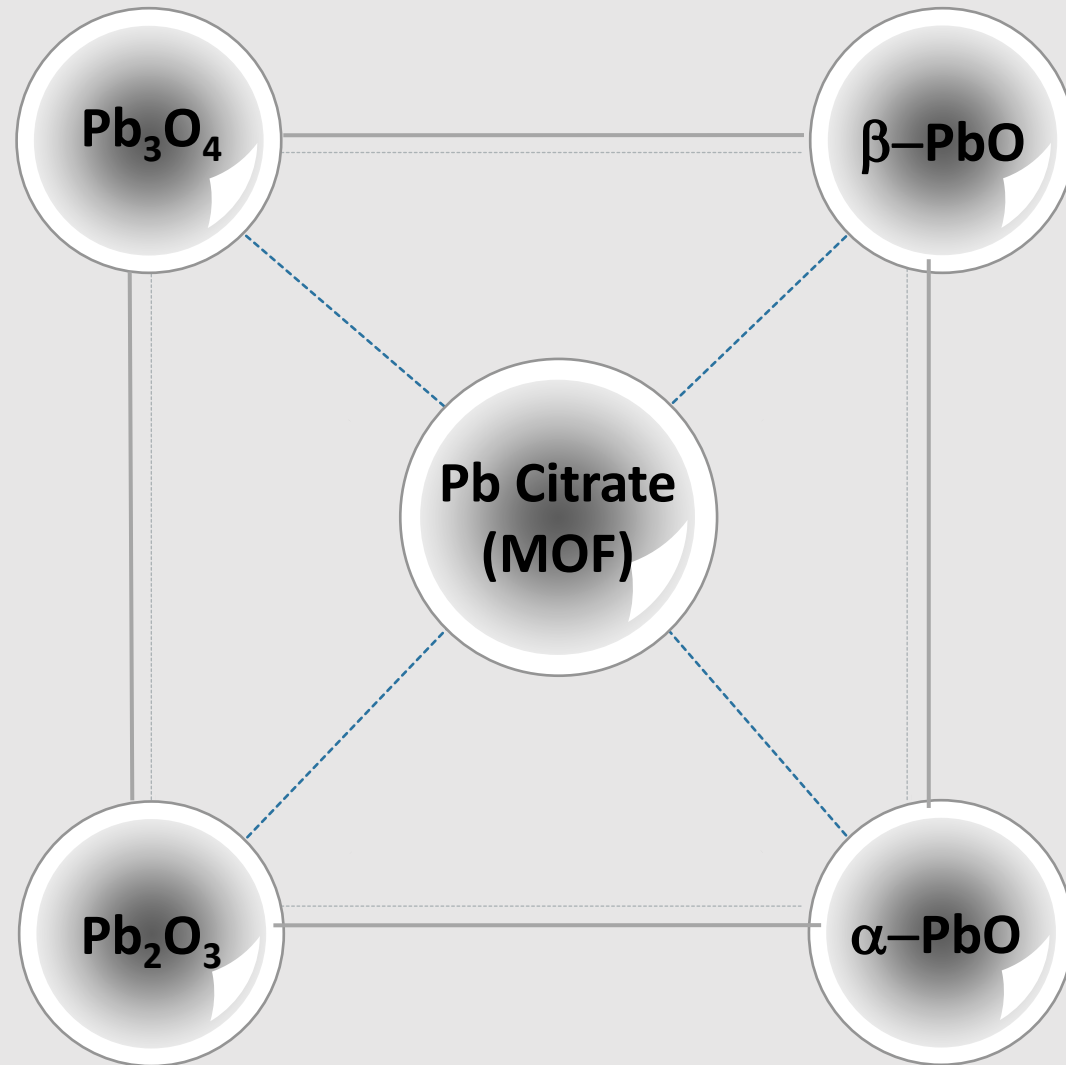
Our "free lead" is in fact spherical shaped. To show this, we have chemically stripped PbO from our leady oxide.

These unusual features make our leady oxide more air-stable (despite the higher reactivity and energy density in application).



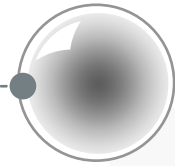


Nano-Oxide Synthesis



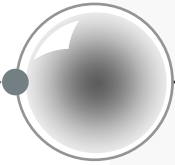
Summary

Direct 'waste to oxide'
(99.99% pure)



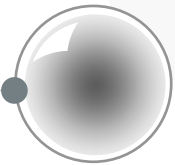
battery-ready

Benign conditions
(water, not fire; no waste)



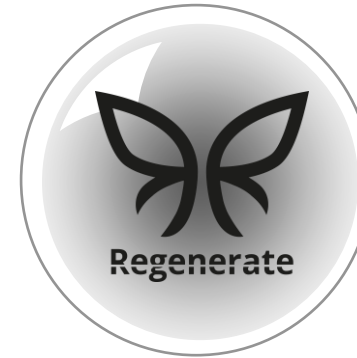
environmentally friendly

Saves money



sustainable

Improves battery performance



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