

How important is the choice of the anode in zinc electrolysis?

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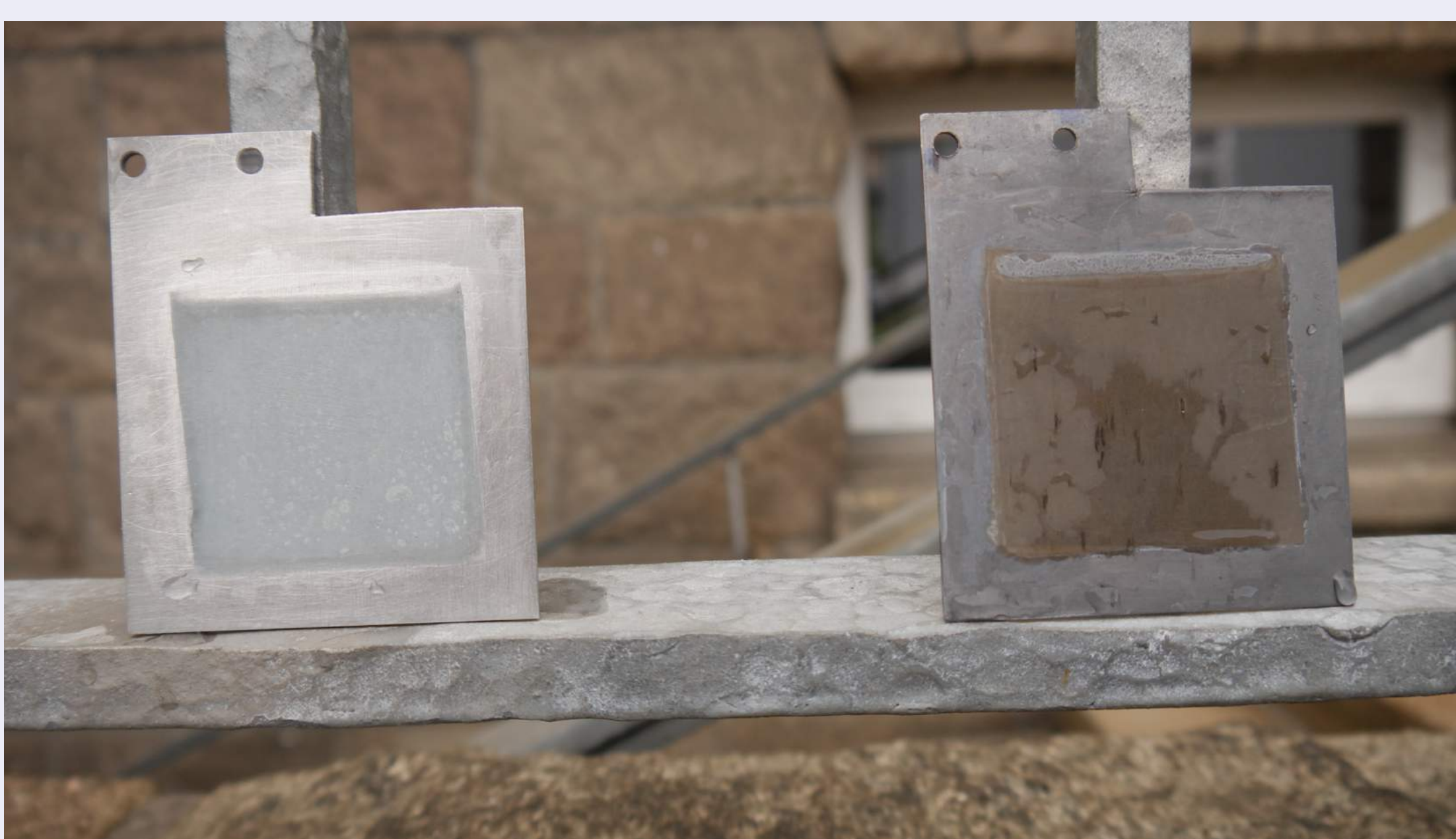
Introduction

We tried to reconstruct the last step in zinc production: The electrolysis of zinc oxide to pure zinc. We got an anode from a local roof tiler that was obviously not inert. We wanted to find out why.



Research Question

We found a brown layer on the lead anode. Therefore we guess it is an PbO_2 -layer. If the brown layer was PbO_2 , the anode should be useable as a cathode in Pb-PbO_2 μ -battery. The same experiment should be tried with the professional Pb -anode.

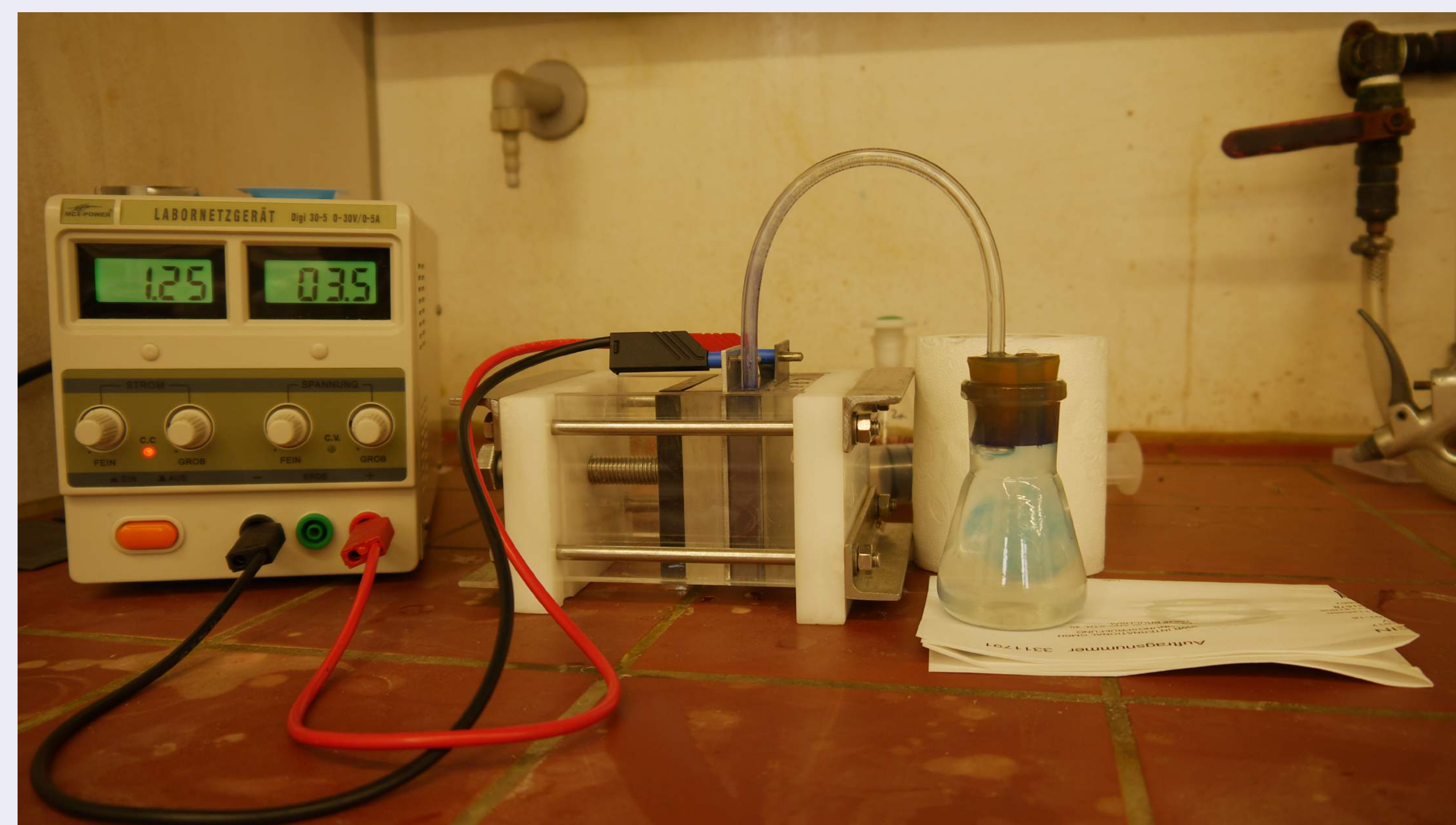


Result

We could power a green LED for about 30 minutes with our self-build battery. Furthermore we measure 0.2-0.4 V under the same experimental setup (electrolysis for 30 min. Coulomb efficiency ~87-92%) with the professional Pb -Anode. So our professional anode is really inert.

Conclusion

Our Pb anode could be different in its material composition. The literature says that Pb which is used by roof tilers contains 0.05% copper, while a lead anode which is used in zinc electrolysis contains up to 1% silver. We guess that this difference explains the different behaviors. Silver could be the catalyst in the water electrolysis – can we make the resulting O_2 generation visible? We adopted with success the blue bottle experiment.



Future perspectives

We want to test our hypothesis, that the two anodes show their different properties due to its material composition with a x-ray diffractometer and measure the exact energy which our 'battery' can deliver.

The blue bottle experiment is a qualitative proof of the water electrolysis as the 'source' of the zinc deposition. Is an experimental set up possible which reaches a quantitative exactness?