Nature meets Technology: Inside the 3D-printed Fungal Battery

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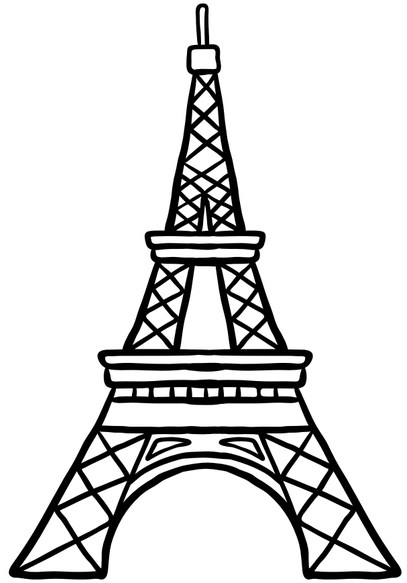
The problem: e-waste

53 million tons of e -waste =



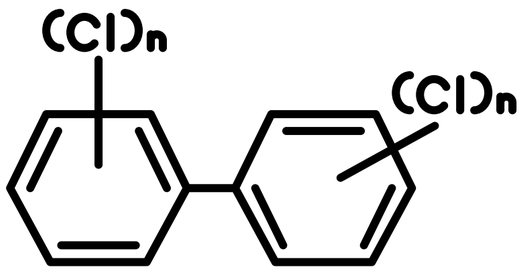
5,000

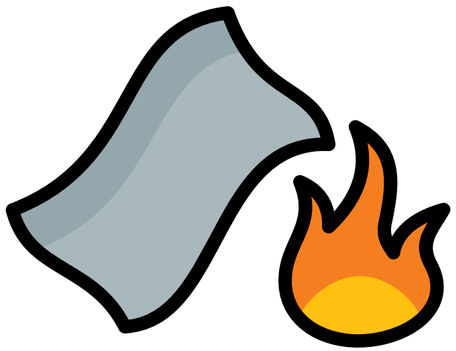
Predicted: 73 million by 2030

Types of ewaste

What’s inside electronics?

28	80	82
Ni	**Hg**	**Pb**
Nickel	Mercury	Lead
58.6934	200.59	207.2





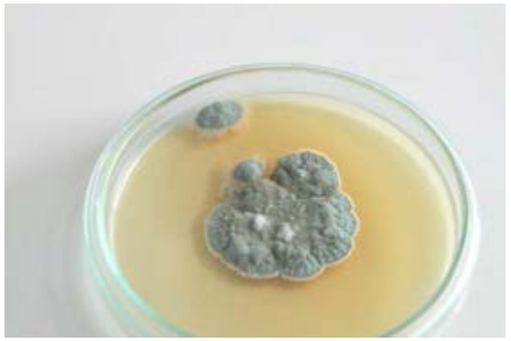
How can we reduce e-waste?

Buy Less

Recycle

Reinvent

Why Fungi?



The Group

CWM
Cellulose & Wood Materials Laboratory

Cellulose

Cellulose based supercapacitor
Aeby et al. Advanced Materials 33.26 (2021): 210132

Images created with BioRender and Canva

The Idea

Cellulose

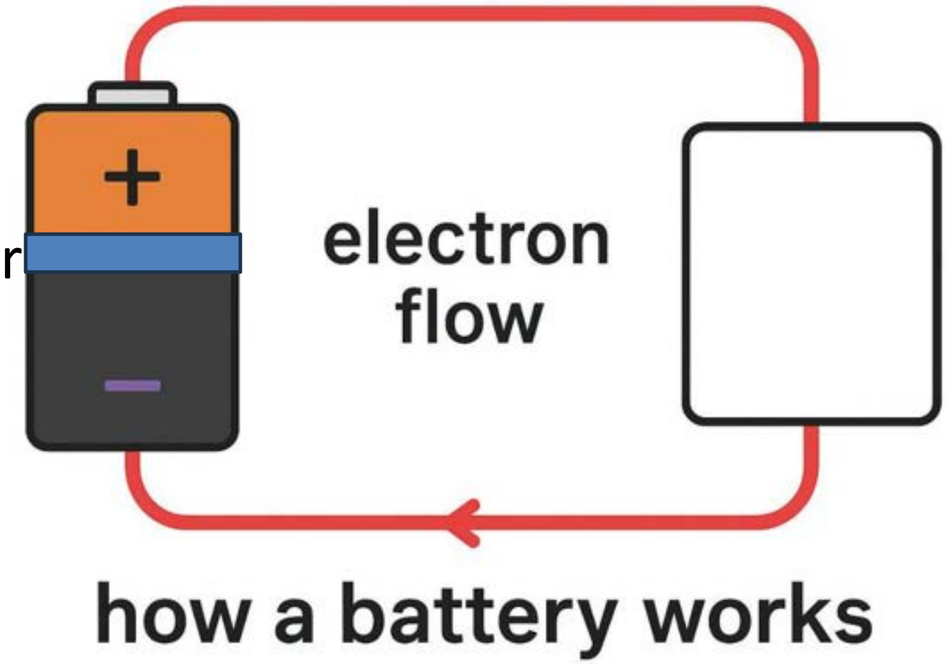
Images created with BioRender and Canva

How a battery works

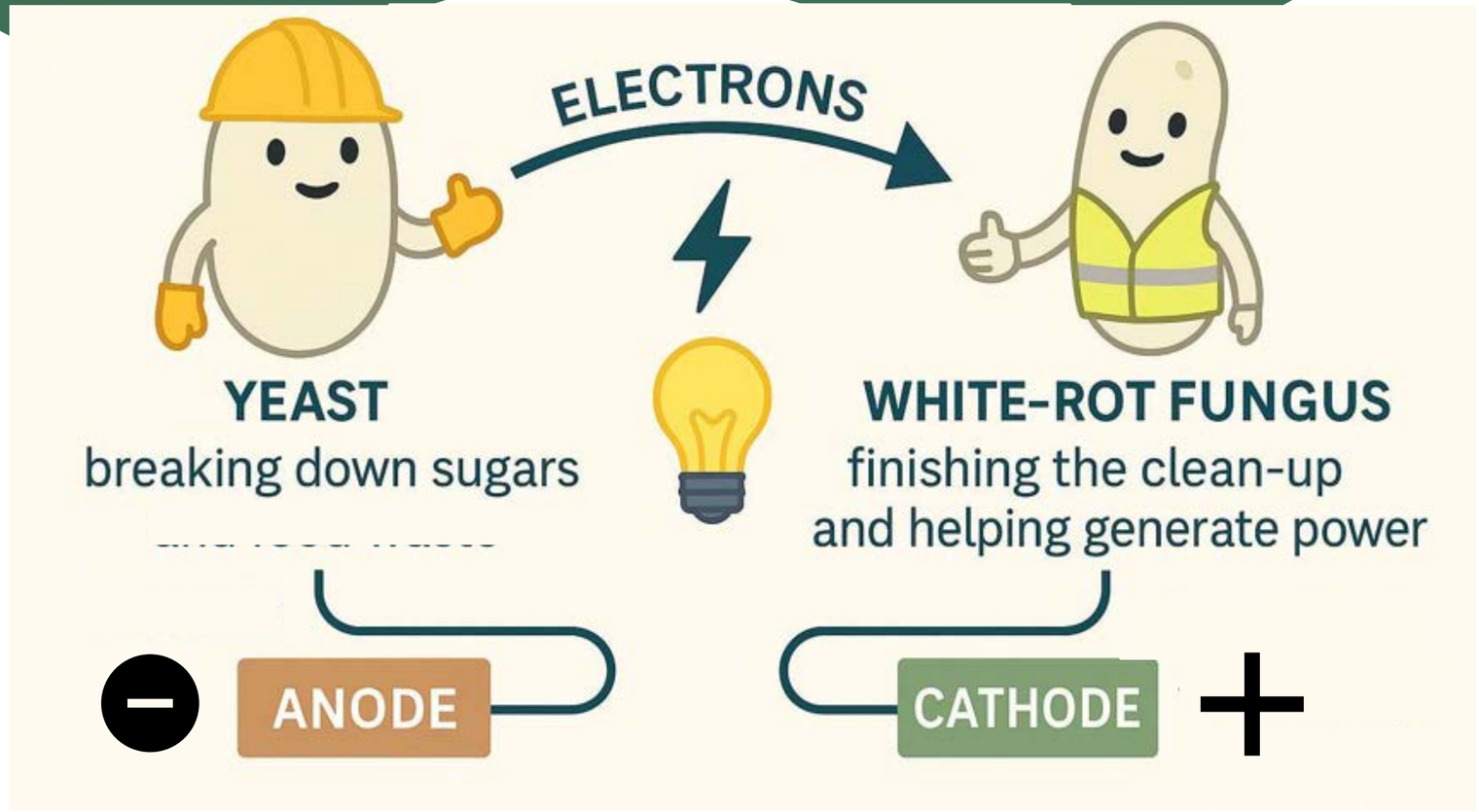
Cathode

Separator

Anode

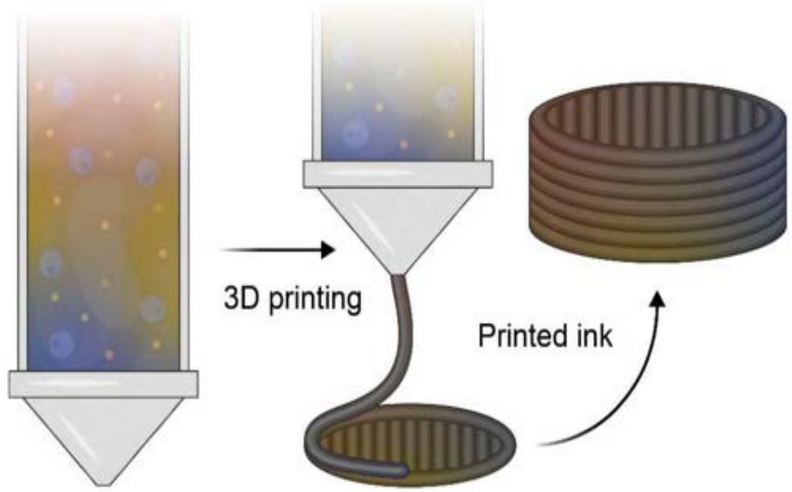


Microbial Fuel Cell (MFC)

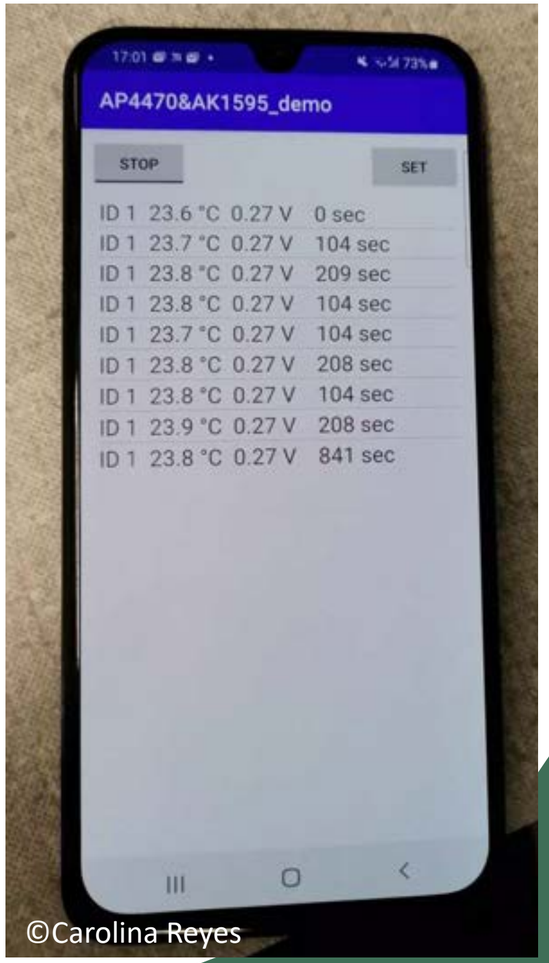


Challenge: Build the battery

Direct Ink Writing (DIW)



Reyes, Carolina, et al. "3D printed cellulose-based fungal battery." *ACS Sustainable Chemistry & Engineering* 12.43 (2024): 16001-16011.


AP4470&AK1595_demo
STOP
SET
ID 1 23.6 °C 0.27 V 0 sec
ID 1 23.7 °C 0.27 V 104 sec
ID 1 23.8 °C 0.27 V 209 sec
ID 1 23.8 °C 0.27 V 104 sec
ID 1 23.7 °C 0.27 V 104 sec
ID 1 23.8 °C 0.27 V 208 sec
ID 1 23.8 °C 0.27 V 104 sec
ID 1 23.9 °C 0.27 V 208 sec
ID 1 23.8 °C 0.27 V 841 sec
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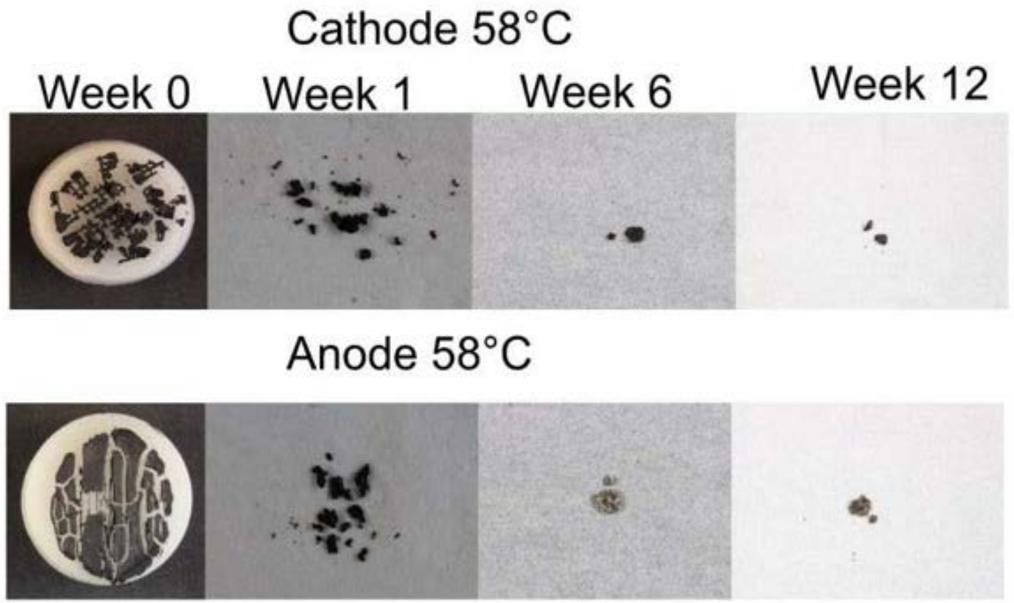
Final Design

DEGRADATION



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Future Applications?

What if batteries could disappear after use?

Thank You!

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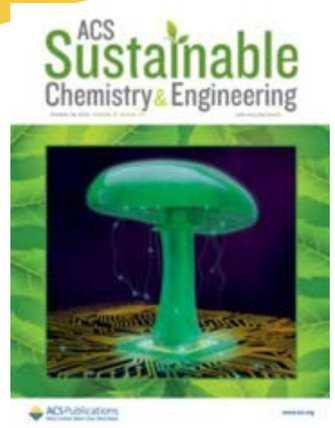
Media Links:

SRF Einstein: https://shorturl.at/R6Pso

SRF 10 vor 10: https://shorturl.at/uCIXX

ARD Brisant: https://rb.gy/be2kzx



https://doi.org/10.1021/acssuschemeng.4c05494

WISSENSCHAFT. BEWEGEN
GEBERT RÜF STIFTUNG

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