



FKITMCMXIX

Sveučilište u Zagrebu
Fakultet kemijskog
inženjerstva i tehnologije



Micro-, Lab-, Pilot- and Industrial Scale Based Biocatalytic Processes for Waste Management

Euro-CASE Annual Conference 2024

Session I

Current environmental sustainability challenges (water resources management, waste recycling, industrial and nuclear decontamination)

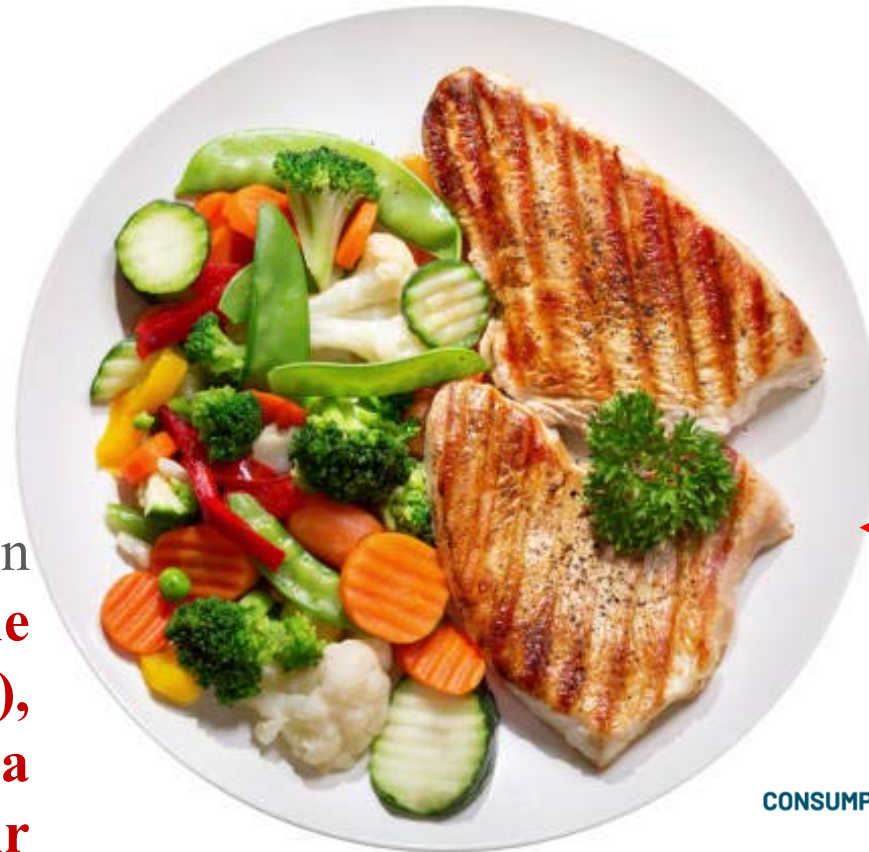
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Budapest, September 23, 2024

Global Problem - Food Waste

1/3 of the food produced in the world for human consumption every year – **approximately 1.3 billion tonnes** – gets lost or wasted.

95% of discarded food ends up in landfills where it produces **methane (CH_4)**, **carbon dioxide (CO_2)**, **hydrogen sulfide (H_2S)**, **ammonia (NH_4)**, **hydrogen (H_2)**, **organic sulfur compounds** and **various acid gases or aerosols**.



CONSUMPTION



GROWING



TRANSPORTATION



PROCESSING



DISTRIBUTION



Circular Economy

(Re)Use



Food



Recycling



Food waste



Waste oils



Organic material

Recovery



Biodiesel

Bioethanol

Biogas

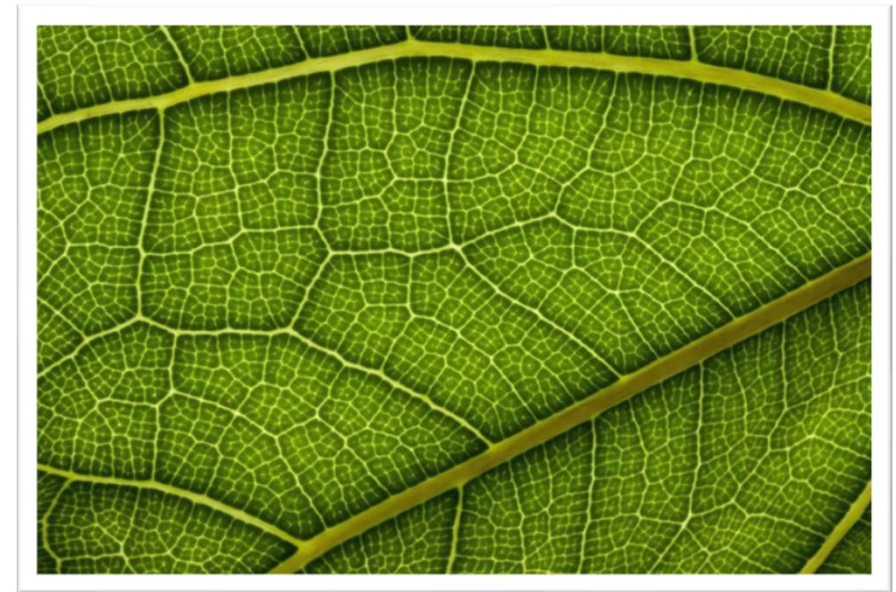
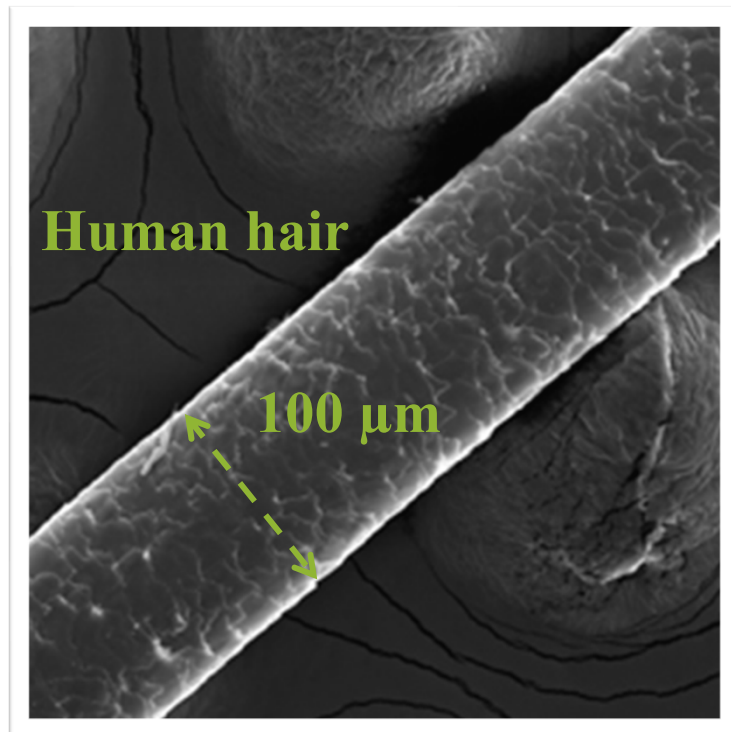
Biohydrogen

Compost



Breakthrough Innovation - Microdevices

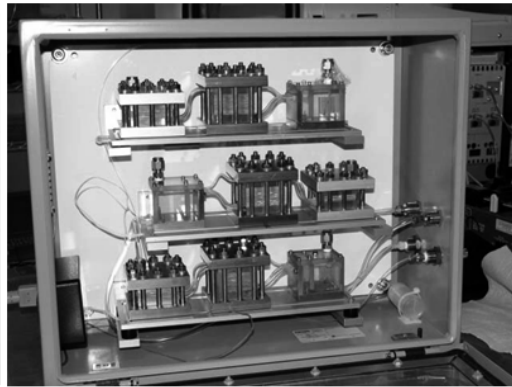
- miniaturized systems, fabricated by microtechnology and precision engineering
- study, development and application based on the scale of 1 -100 μm
- micro-scale used for the realization of many biological processes in nature (leaf, alveoli, kidney...)



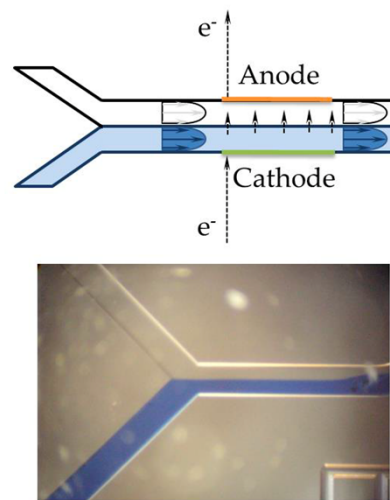
Production of Biofuels in Microdevices

Biodiesel Portable Plant

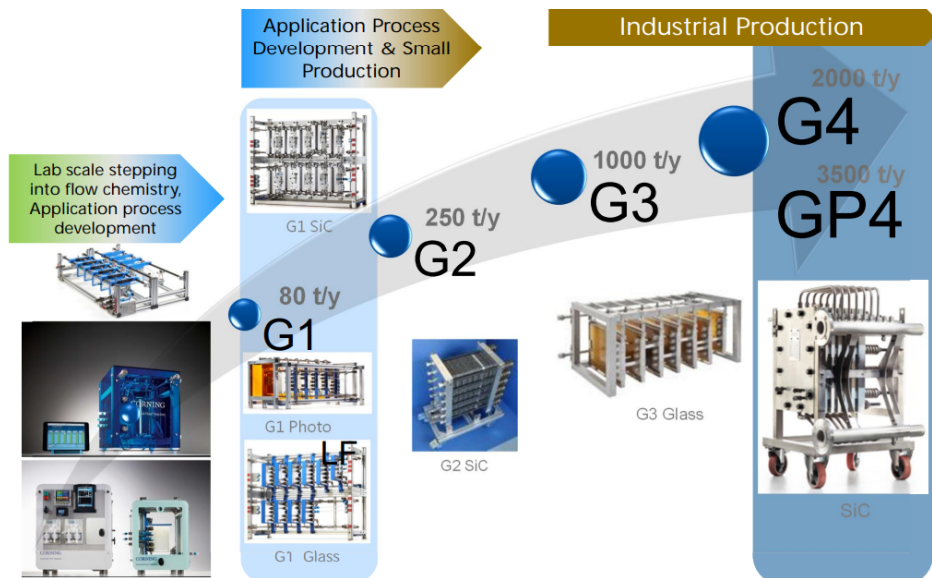
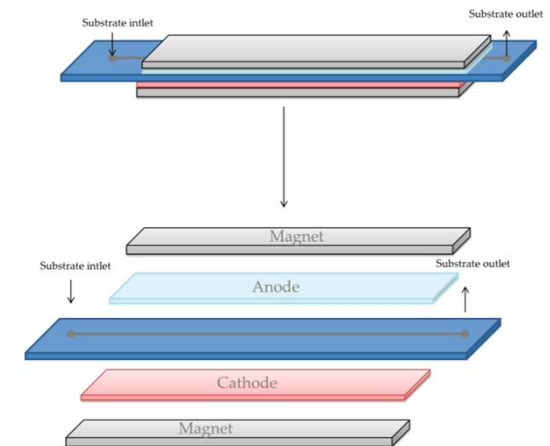
- 50.8 x 40.6 x 20.3 cm
- capacity: 12 cm³/min (17.3 dm³/d)



Microfluidic fuel cell (MFFC) for BioH₂ Production



Microfluidic microbial fuel cell (MFMFC) for BioH₂ Production

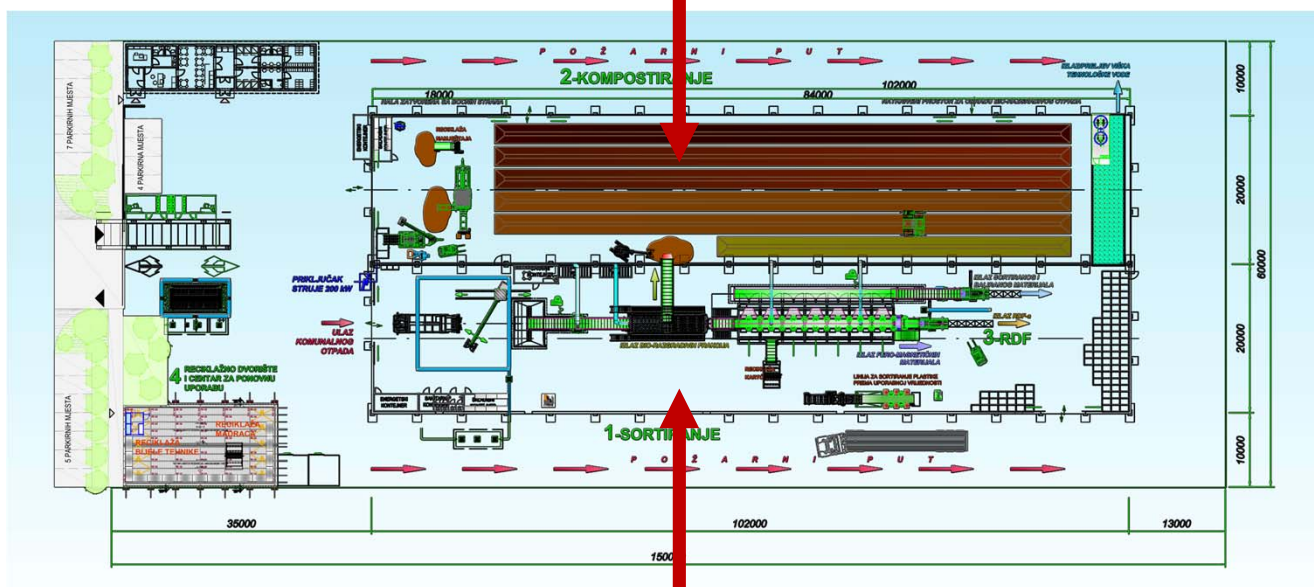


Composting process on an industrial scale (12,000 t/annually)

composting



sorting



Acknowledgment



PTF



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