APPROACH

From Sunlight to Fuel: The Future of Solar Energy

Aby Cheruvathoor Poulose

CATRIN-UP

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Challenge: Sustainable Transformation of Biomass into Fuels & Chemicals

🌍 The Problem

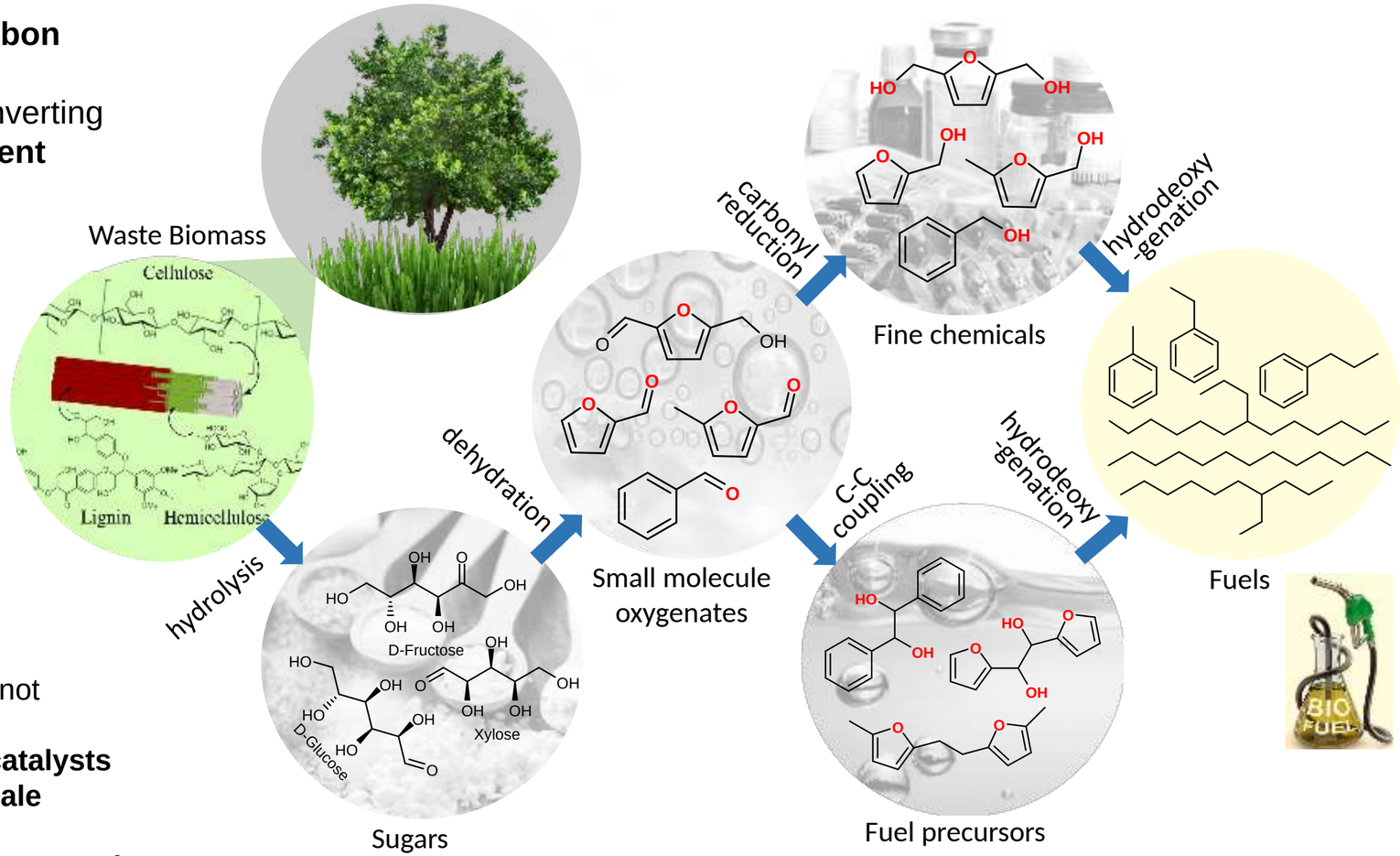
- **Fossil Fuel Dependency**: Over-reliance on depleting fossil resources for energy and chemicals.
- **Environmental Impact**: Fossil-based processes increase **carbon emissions**, accelerating climate change.
- **Inefficiency in Biomass Utilization**: Current methods for converting **lignocellulosic biomass** are energy-intensive and lack **efficient catalysts** for scalable, cost-effective transformation.

🔍 Research & Industry Gaps

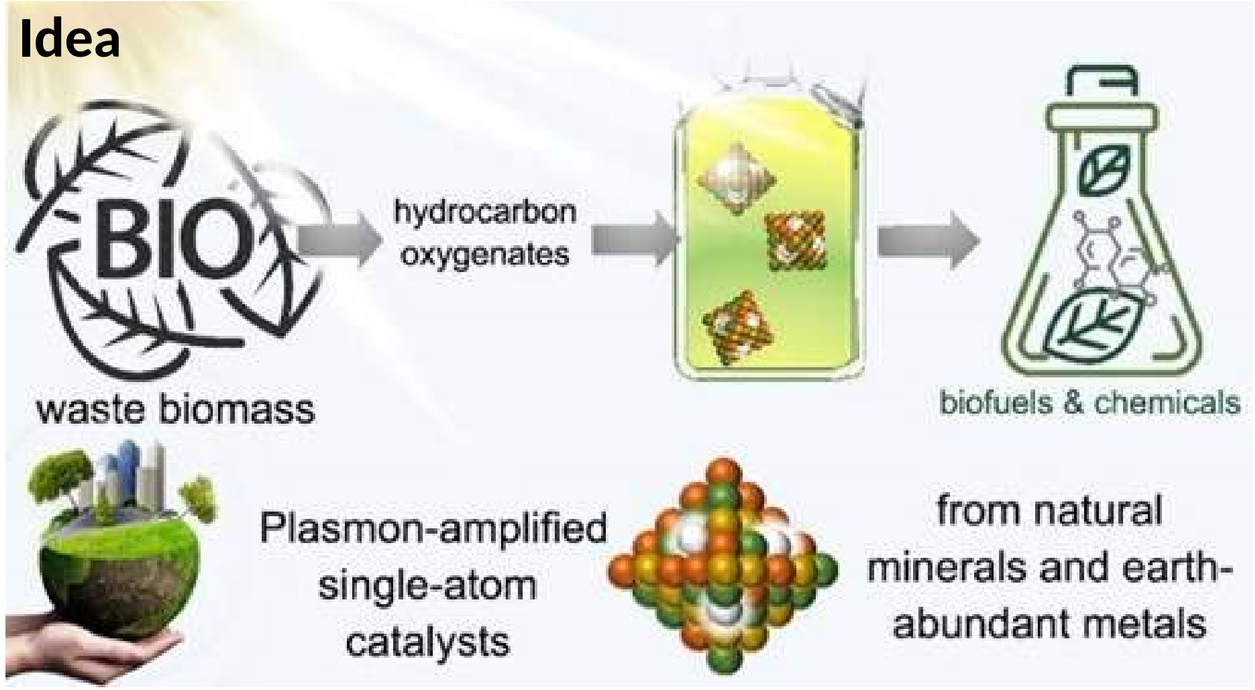
- **Catalyst Limitations**: Existing catalysts are either **expensive (noble metals)** or **lack stability** for long-term use.
- **Energy Density**: Biomass-derived fuels need **higher hydrogen content** to match the energy density of fossil fuels.
- **Scalability**: Limited **industrial adoption** due to inefficient processes and lack of **cost-effective** photocatalysts.

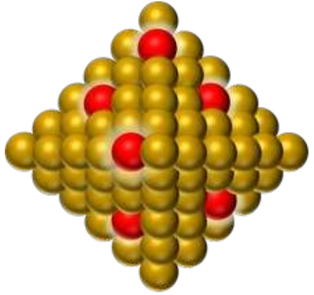
💡 The Opportunity

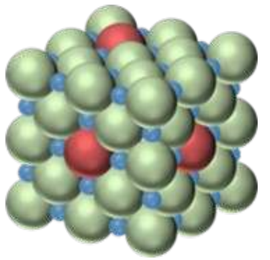
- **Renewable Carbon Source**: Lignocellulose is **abundant** and does not compete with food supply.
- **Advanced Photocatalysts**: Developing **efficient, reusable photocatalysts** can bridge the gap between laboratory innovation and **industrial-scale** biomass conversion.
- **High-Value Products**: Unlocking sustainable routes to **fuels, polymers, and fine chemicals** addresses both economic and environmental demands.



Idea



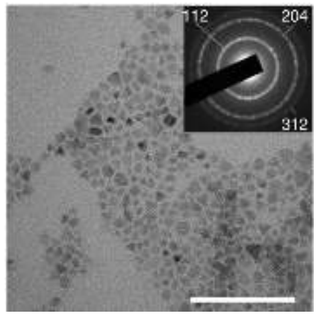


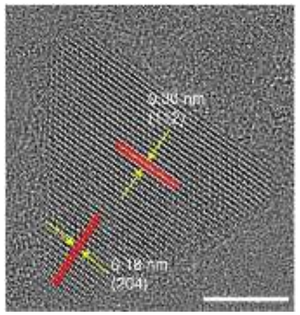


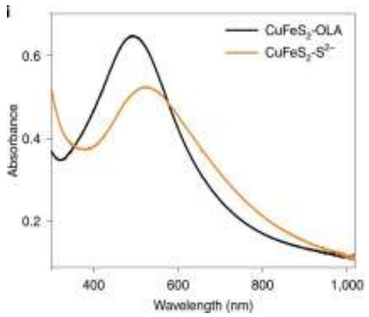
Single atoms attached plasmonic nanocrystals

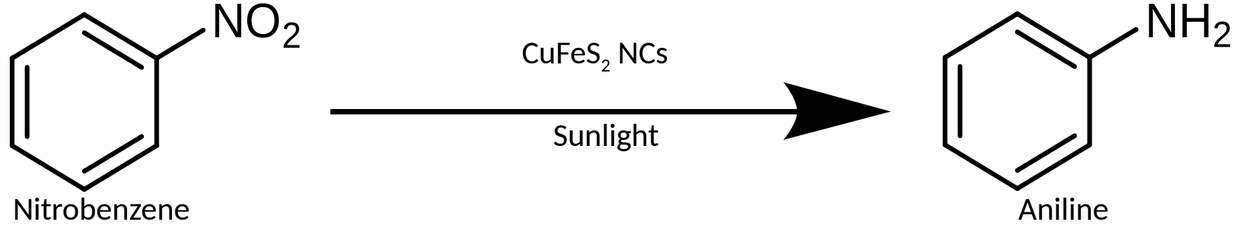
Project aims to develop a sustainable technology based on plasmon-amplified single-atom catalysts (SACs) for valorizing biomass into high-value chemicals and fuels. The strategy to achieve this is inspired by the naturally evolved system of photosynthesis in plants that involves the absorption of sunlight by pigments (here the plasmonic nanocarrier), which channels this energy into the enzyme's active catalytic metal center (here the single atoms coupled to the surface of the photoactive nanocarrier).

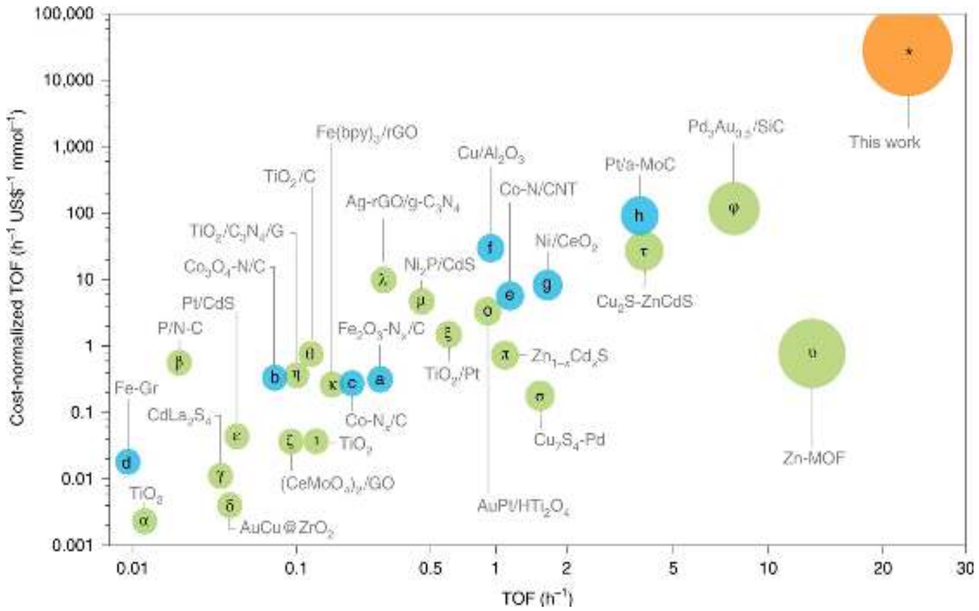
Our background











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WO Patent WO 2022/199724 A1

Transforming Waste into Fuels & High-Value Chemicals

Efficient, Abundant, and Reusable Photocatalysts with Single-Atom Sites

Advancing Sustainable Chemical & Fuel Production

- **Higher yields at lower costs** using waste biomass.
- Demonstrating **efficient, reusable** single-atom photocatalysts.

Driving Innovation & Future Research

- Enabling **next-generation photocatalysts** for diverse chemical and fuel transformation.
- Accelerating research toward **more efficient and scalable** green technologies.

Supporting Global Clean Energy Goals

- Aligns with **REPowerEU**: **32% renewable energy** in transport by 2030 (from 8.2% now).
- **Up to 86% reduction** in greenhouse gas emissions via biofuels (U.S. Department of Energy).
- Greater impact with **waste-derived** biofuels.

Unlocking Economic & Investment Potential

- **Cost-efficient** technology for sustainable industrial transformation.
- **New investment opportunities** in renewable chemicals and fuels.

Securing Innovation through Intellectual Property

- **Patent protection** planned for groundbreaking photocatalyst designs.
- Ensuring **competitive advantage** and commercialization.

✅ Invest Today – Shape a Sustainable Tomorrow

What We Need to Turn This Vision into Reality

🧑‍🔬 Expert Team Expansion & Collaboration

- **Hiring specialized researchers** (catalysis, photocatalysis, materials science).
- **Industry collaboration** to scale from lab to real-world applications.
- **Next Step:** Partner with industrial stakeholders for pilot testing.

🔬 Extended Research & Development Timeline

- **3 years** of focused R&D to optimize photocatalyst design and scalability.
- Develop **prototype systems** for waste-to-fuel transformation.

💰 Financial Support Estimate

- **€500,000 Total Investment** for project execution:
  - **€200,000** – Personnel (researchers, technical staff).
  - **€150,000** – Infrastructure (lab upgrades, pilot-scale reactors).
  - **€150,000** – Materials (high-purity precursors, catalyst synthesis, characterization).

Why Invest Now?

- **Early-mover advantage** in sustainable fuels and high-value chemicals.
- Unlocking **patentable innovations** with major commercial potential.

✅ Your Support Fuels the Future – Let’s Make It Happen Together

APPROACH

THANK YOU

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