Plastic Wastes Enabling Decarbonized Chemical Manufacturing

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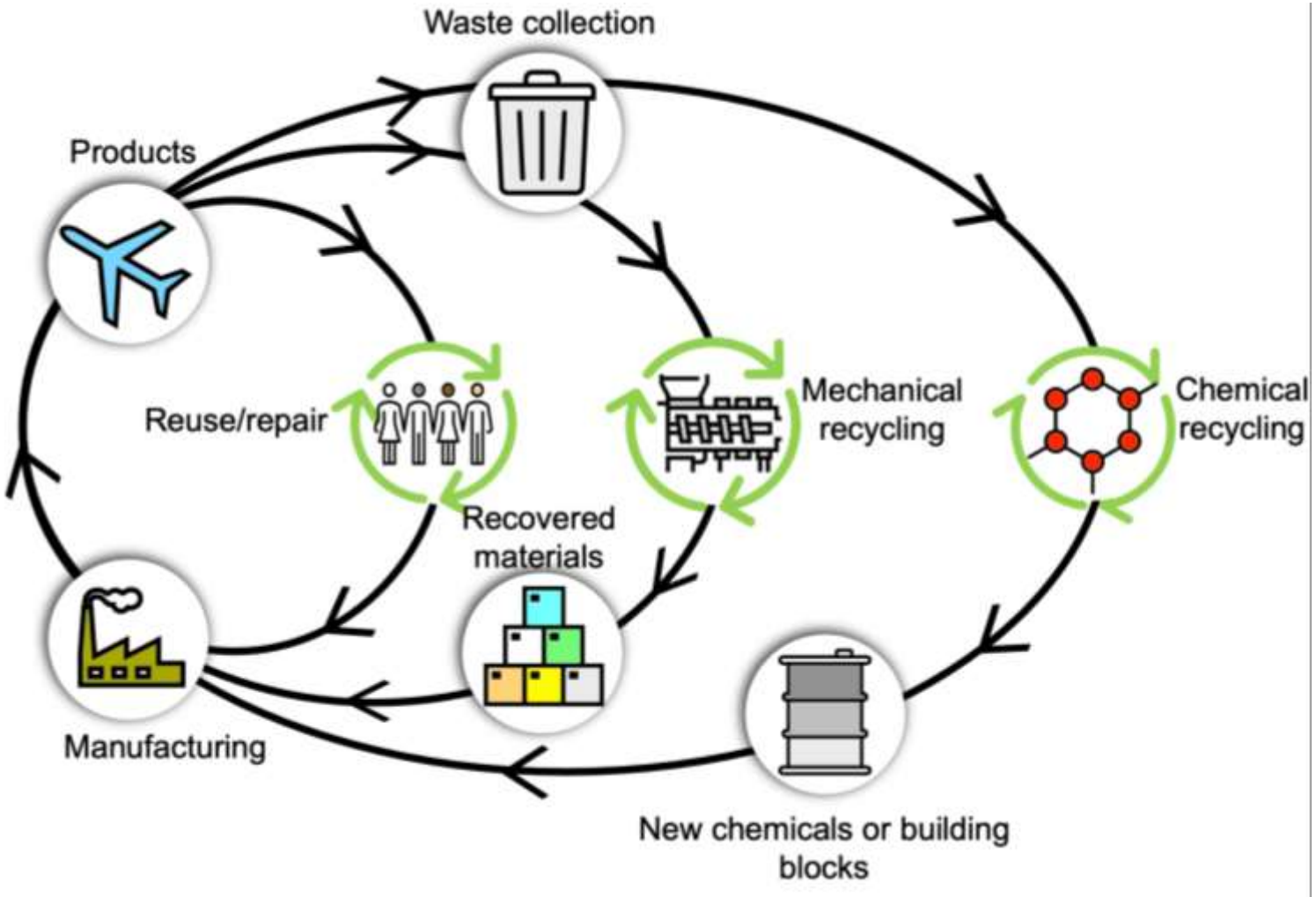
Decarbonized Manufacturing: What are Key Elements to Consider?

Materials Circularity: No Waste, All Resources



Reuse/Repair

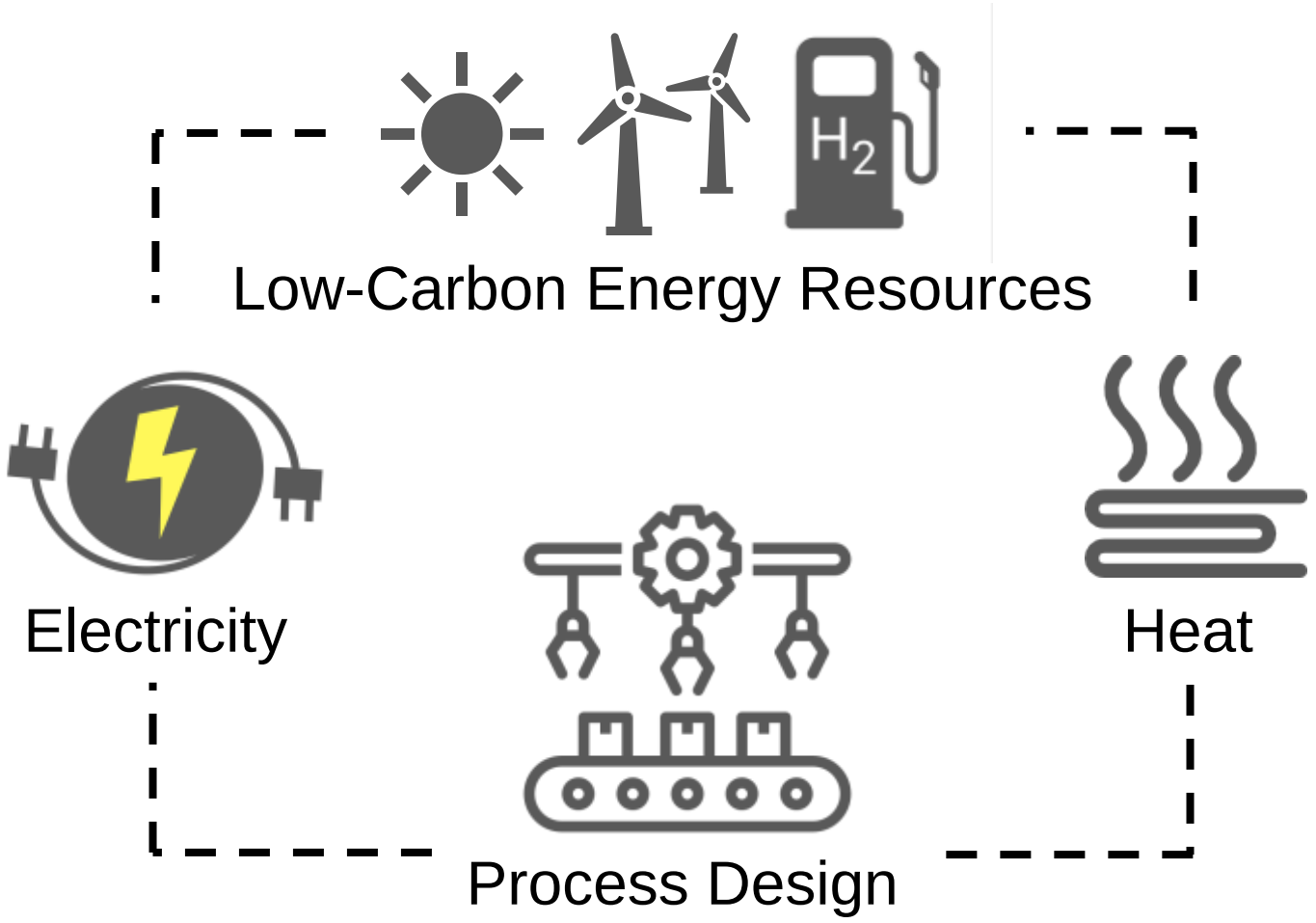
Recycling/Upcycling

Life Cycle (Carbon Footprint)

Renewable, Reliable, and Affordable Feedstock

Decarbonized Manufacturing: What are Key Elements to Consider?

Manufacturing Process: Sustainable and Energy Efficient



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Life Cycle (Carbon Footprint)

Renewable, Reliable, and Affordable Feedstock

Renewable Energy

Carbon Capture and Utilization

Electrification

Resource Efficiency

Key Challenges to Address:

Plastic Waste Reutilization (< 7% Recycling Rate, the lowest)

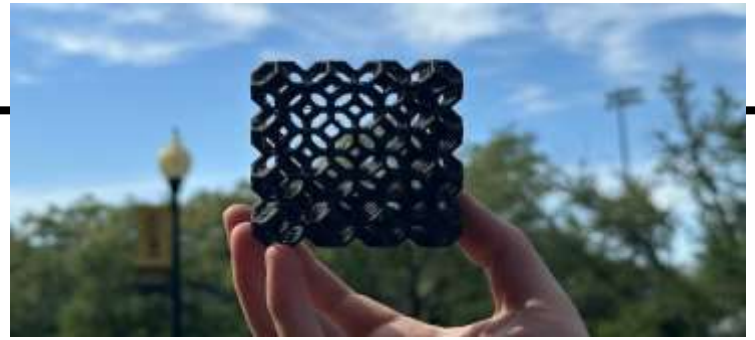
Decarbonizing Heat (~30% of Global CO_2 emission, the highest)

A Technology Design to Simultaneously Tackle Multiple Opportunities

Plastic Waste

Electrical Heater

Upcycling



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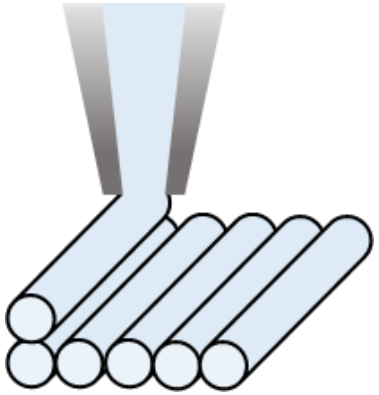
Electrified Heating

Resource Efficiency

Additive Manufacturing of Carbons from Polyolefin Wastes

FDM printed polypropylene (PP)



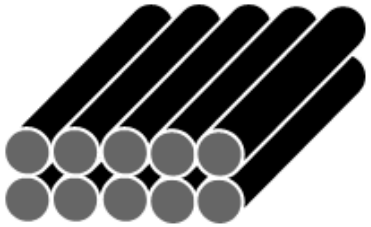
Crosslinking

130 – 170 °C

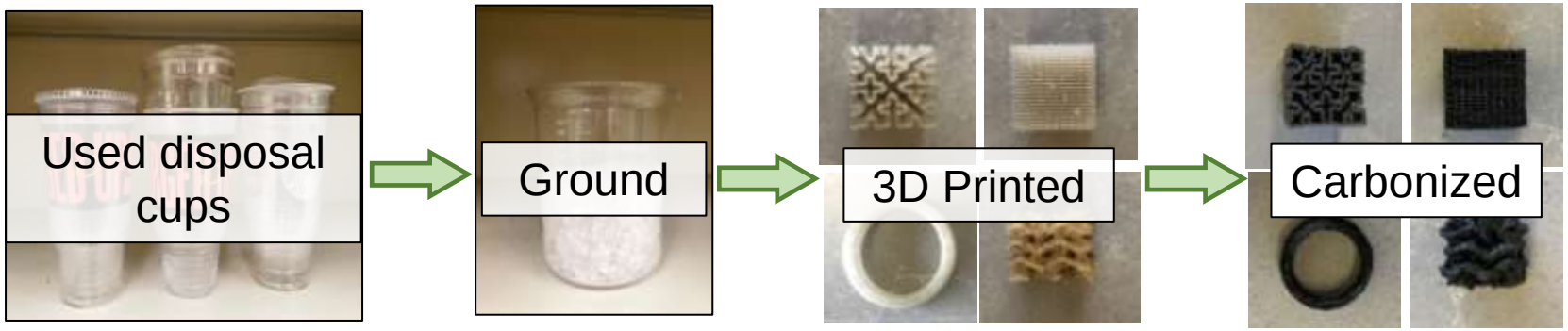
Carbonization

800 °C

Structured carbon



Adv. Mater. 2023, 2208029

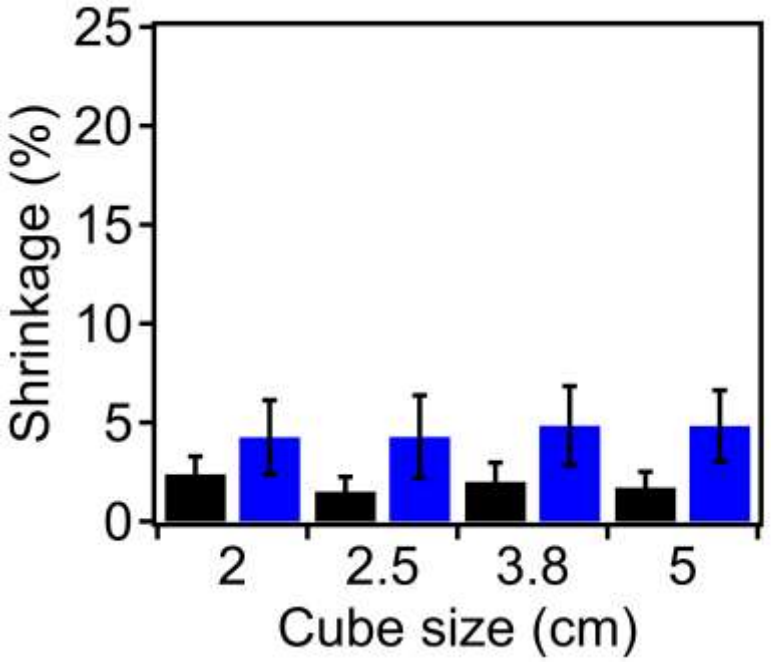


Waste PP as feedstock

Consistent yield and volumetric shrinkage

Plastic Wastes to Carbons with Accurate Structural Control

From Printed to Carbonized, <5% Shrinkage Enabled by Fiber Inclusion



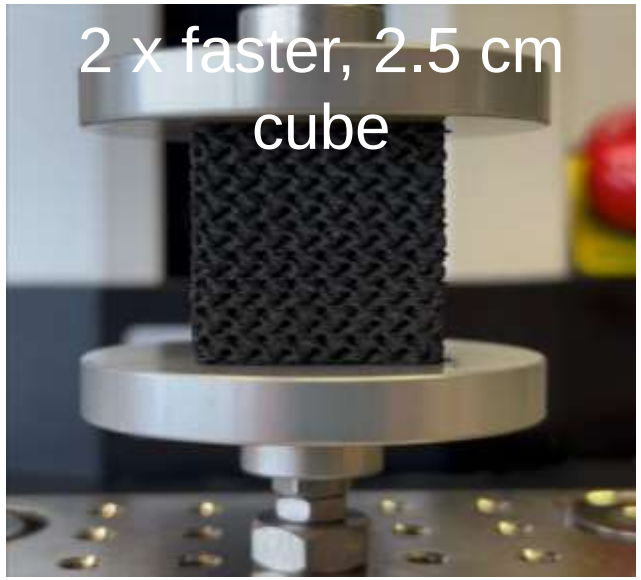
Outstanding Joule Heating Performance

Extending to Chemical Synthesis and Carbon Capture

Acknowledgements

Qiang Research Group
- Paul Smith
- Alejandro Guillen
- Mark Robertson
- Anthony Griffin
- Ethan Bounds
- Mikaela Sadri
- Sara Valdez
- Yuming Wang
- Carmen Dunn
- Bradley Lamb

Collaborators
- Dr. Derek Patton
- Surabhi Jha
- Dr. Shan Yang



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