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"Meeting Tomorrow's Needs Today"

How Cost-Advantaged Biochar Fillers Enhance the Performance of Composites and Plastics

Presented at the Biochar 2018 Conference

By; Joseph J. James, President

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What is Biomass?

Biomass **is anything living, or that has lived, such as plants, trees, and animals.**

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What is Biochar?

Biochar is "Carbonized" **Biomass**.

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Challenges & Opportunities

Challenges:

- Markets for Biochar Are Not Well Defined
- There are Various Biochar Types & Blends

Opportunities:

- Biochars Have a Variety of Uses
- Growing Demand for "Better" Products
- ATP's CRBBP Process Can Lower the Cost of Making Certain Biochars

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"Fillers" Make Plastics, Composites & Tires Better

Plastics, Composites and Tires are made by combining Polymers and various powdery "Fillers" or "Extenders", made from Carbon Black, Mineral Powders, or Wood Flour, which provide strength, body and other desired characteristics.

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Our Biochar Makes Better Fillers

Research has shown that our Biochar Fillers make Plastics and Composites that are stronger, lighter and more water and heat-resistant, depending on which fillers they displace.

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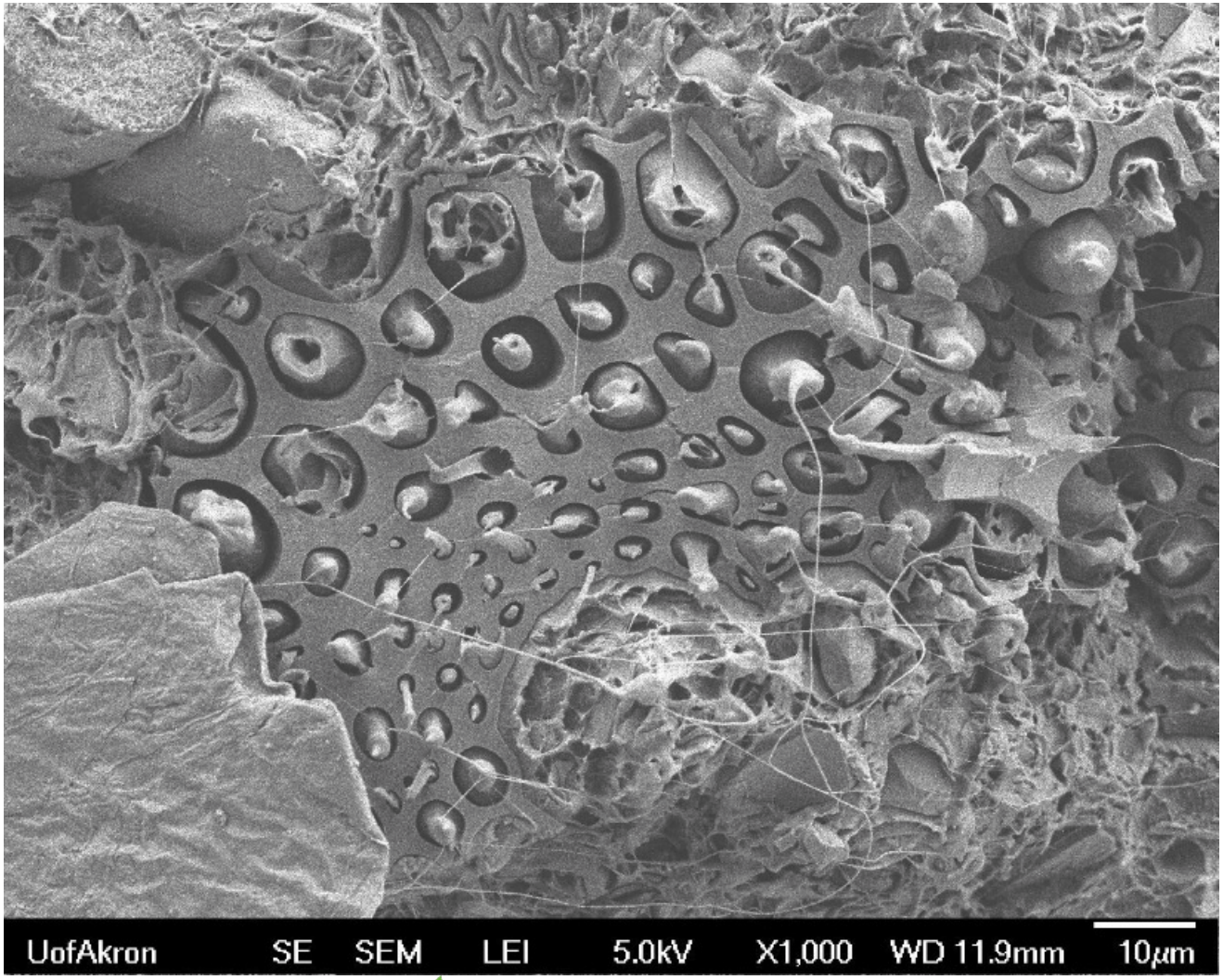
Polymer-Biochar Interactions



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Challenges & Opportunities

Challenges:

- Bio-Products Often Cost More
- Need/Cost of Remediating Soil and Water

Opportunities:

- Growing Demand for Bio-Based Products
- ATP's CRBBP Process Lowers Costs for Remediation, Biomass & Bio-Products

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ATP's CRBBP Process

ATP plants and then sequentially multi-tasks bio-crops and their biomass, to do good things, for people and the planet, less expensively.

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ATP's CRBBP Process

Remediation

Plant Bio-Crops → **Harvest/Shred Bio-Crops** → **Make Bio-Products**

1. **Fillers***
2. **Bedding**
3. **Biochar***

* Torrefaction

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Bio-Crops Are Bred to Grow Fast, Big and to Do Good Things!!!

Standard Sorghum

Biomass Sorghum

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Sequential Multi-Tasking Shares & Reduces Costs

For 1 Task Cost = $C/Task 1

For 3 Tasks Cost = $C/(T1+T2+T3)

For ∞ Tasks Cost = $C/(T1…T∞) = $0

Production Costs = $C

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Initial CRBBP Process Project: The Chesapeake Bay Watershed

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ATP's Bio-Product Markets

- **Fillers:** The **$380 billion** US plastics market
- **Poultry Bedding:** The **$48.3 billion** US poultry market
- **Biochar:** The **$8 billion** US garden consumables market

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ATP's Collaborators

Industry: Bio-Crop Seed Companies, Farmers, Plastic Manufacturers, Etc.

Federal: EPA, USDA: ARS-WRRC, NRCS, Rural Development, USCP

States: MD, SC (TBD: DE, NC, PA, VA)

Universities: Clemson, NC State, Penn State, Univ. of Akron, UMD, Univ. of SC

NGO's: Enviro. Orgs., NRWA, WERF, Etc.

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