Advanced Bio-Based Materials

Resources:
• Extractives
• Hemicelluloses
• Cellulose
• Lignin
• Tannins
Advanced Bio-Based Materials

Cellulose Whiskers

- Coatings
- Barriers
- Drug Delivery

Cellulose Nanoballs

Fibrous Composites

- Pulp/Paper
- Rayon
- Viscose

Cellulose Acetate

Cellulose Ethers

Bacterial Cellulose
- Arteries/Artificial Skin
- Films/Foams
- Hydrogels

Microfibrilated

Foams

Composites

Chemicals

Hydrogels

Films

Coatings

Cellulose Aerogels
Advanced Bio-Based Materials

HemiCelluloses

- Foams
- Emulsifier
- Fiber Strength Aid
- Gel
- Binder
- Coating
- Hydrogels
- Chemicals
- Films
Advanced Bio-Based Materials

- BTX-Naptha<<Chemical-Hydro Cracking> Biofuels
- Battery, tires
- Cosmetics
- Carbon Fibers
- Carbon Sieves/Activated
- Co-Polymer Resin/Binder
- Polyurethane Foams
- Phenols<<Pyrolysis> Biofuels
- Pellets> Combustion> Power
- Combustion> Power
- Dust Control
- Concert Additive
- Wood adhesive
- Surfactants - Dispersants
- Asphalt Additives
- Phenols
- Anti-Oxidants & Slow Release Agent
- Epoxies, Polyesters
Advanced Bio-Based Materials

Bark Tannins:
• Concert additive
• Adhesives
• dispersants
• Binders
• Deflocculants
• Antioxidants
• Sequestering agents
• Flotation agents
• Stabilizers in asphalt emulsions,
Advanced Bio-Based Materials

Extractives

• Non-cell wall components that can be removed using solvents, steam, kraft pulping

• Typically small molecular weights, < C40

• Usually 1-5% of the biomass

• Numerous components that vary from species to species

• Applications include resource for production of lubricants, adhesives, rubbers, inks, emulsifier. And drilling fluids. The pitch is used as a binder in cement, an adhesive, and an emulsifier for asphalt.