Solid Carbon Products LLC

The Business of transforming CO_2
from an environmental liability into a profit center.

www.solidcarbonproducts.com

Noyes Process – Converting CO_2 into durable carbon

Extract carbon dioxide from the air

Convert into materials needed for our human-built environment
- built of carbon derived from the CO_2 in the atmosphere.

Convert CO_2 profitably – with only by product being distilled water

$$CO_2 + 2H_2 \rightarrow C_{Solid} + 2H_2O$$

Let's invoke profit as a driver for environmental good.

Do well financially, by doing good.

SCP – Catalytic Conversion of CO_2 into Carbon Nanomaterials

CO_2

Hydrogen
or
Natural Gas

Carbon Nanomaterials

Distilled Water
Agricultural & Industrial Use

Sources of CO_2 - SCP is source agnostic

CO_2 direct purchase

CO_2 via a carbon capture technology

CO_2 Bulk Purchase	Natural Gas Extraction	Energy Generation	Industry or Waste Mgt	Direct Air Capture
CO_2 purchased in bulk	CO_2 removed from natural gas to ready the gas for sale	CO_2 captured from fossil fuel combustion flue gases	CO_2 by-product captured during manufacturing process – cement, carbon black, or from eg landfill or agricultural mgt	CO_2 captured directly from the atmosphere

Noyes Process is Carbon-Negative

Carbonomics® has evaluated the Noyes Process and "the numbers indicate that the overall process is **carbon-negative** - in other words, there is a **net carbon reduction** – under just about any configuration of the technology".

The patented Noyes Process is the first emission-free, carbon-negative continuous process to economically produce multiple carbon morphologies from CO_2 & H_2 or CH_4.

Carbonomics® is a leader in helping businesses realize the potential of carbon credits in the US and international emission-trading markets. Carbonomics identifies greenhouse-gas (GHG) reduction opportunities, determines how projects can generate carbon credits, and guides companies through the entire process - from project inception to annual verification. Carbonomics® also helps local governments set up community choice programs that accelerate renewable energy development and reduce GHGs.

http://www.carbonomicsonline.com/

Current pilot production unit – 0.3 tpm – in service since 10/2016

Carbon Nanomaterials – applications & market size 2018

CO_2

Hydrogen
or
Natural Gas

Carbon Nanomaterials

Distilled Water
Agricultural & Industrial Use

Carbon Black
Tires, Plastics, Coatings
13,000,000 MT

High Purity Carbon
Graphitic Electrodes
Anodes
1,580,000 MT

Carbon Nanofibers
Composites
Aeronautics
70,000 MT

Carbon Nanofibers/Tubes
Electronics, Medical
5,000 MT

Carbon Nanomaterials – applications & market size 2018

CO_2

Hydrogen
or
Natural Gas

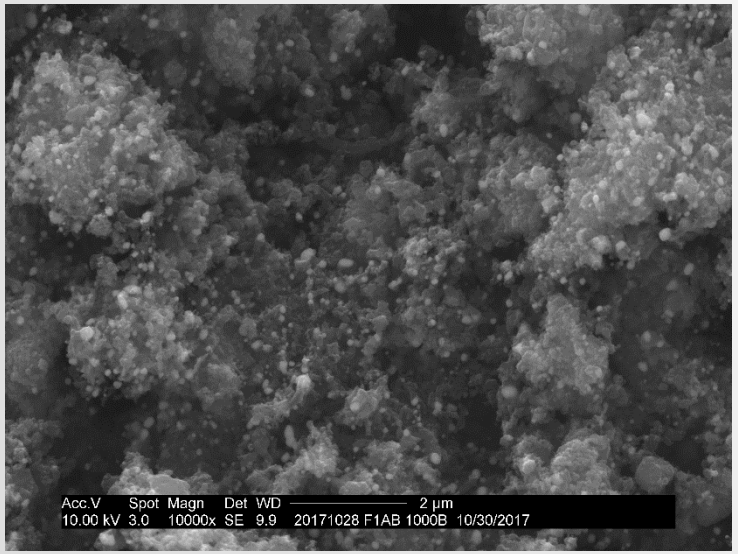
Carbon Nanomaterials

Distilled Water
Agricultural & Industrial Use

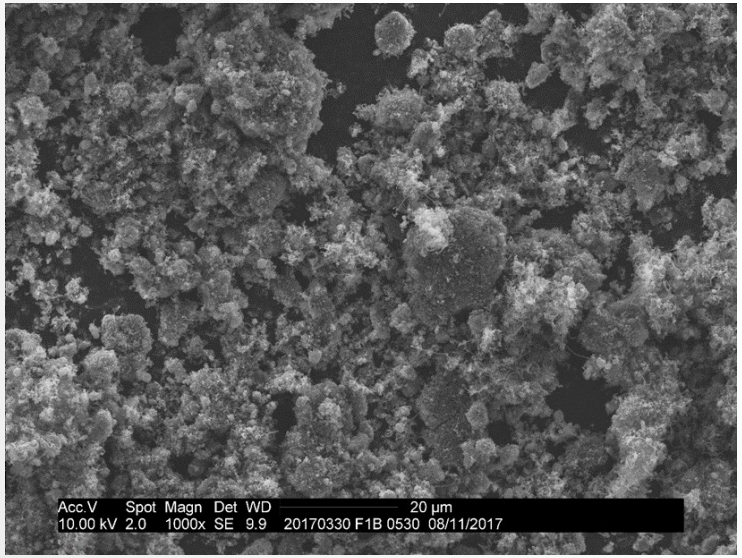
	Billions
Carbon Black Tires, Plastics, Coatings 13,000,000 MT	$18.2
High Purity Carbon Graphitic Electrodes Anodes 1,580,000 MT	$4.0
Carbon Nanofibers Composites Aeronautics 70,000 MT	$2.5
Carbon Nanofibers/Tubes Electronics, Medical 5,000 MT	$0.6

SCP Carbon Products – tailored to desired properties

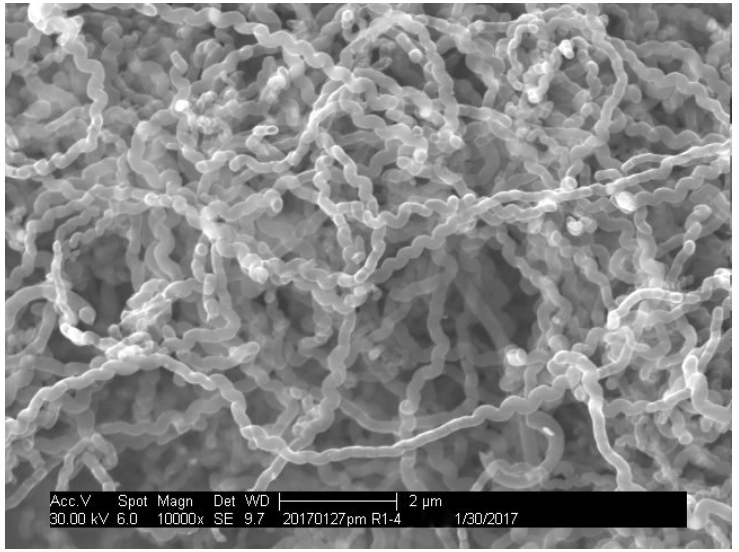
- Product Morphology is controlled by dialing in system operating envelopes.
- Parameters which, in combination, define operating envelopes:
  - Reaction gas : composition, flow rate
  - Partial pressure of water in reaction gas stream
  - Reactor temperature, gradient, catalyst
- Images below at 10,000 times magnification



Carbon Black

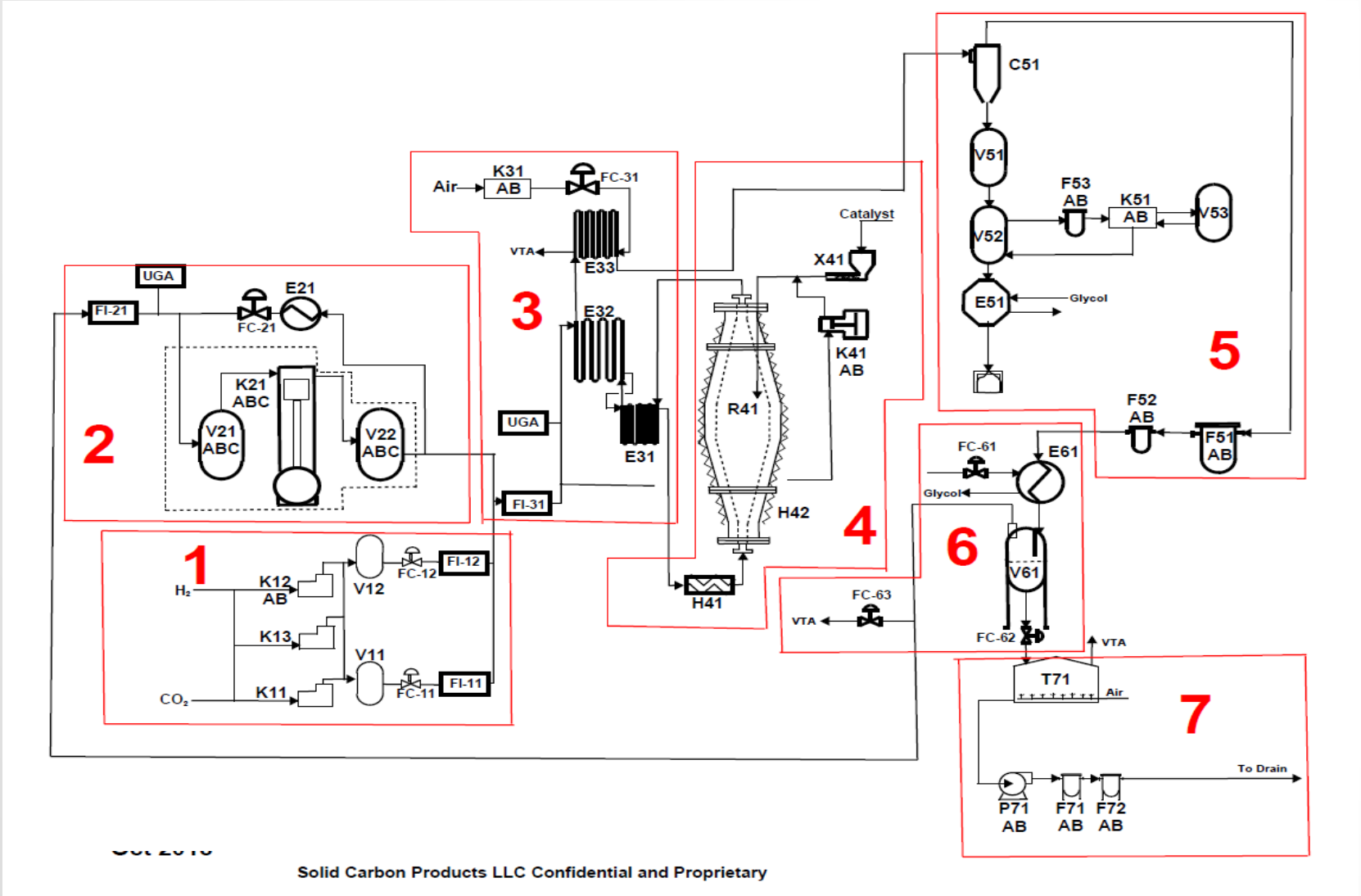


Carbon Black with % CF



Carbon Fiber

Next step in scale – 50 tpm of Carbon Nanomaterials



Plant Sub-Systems

1. bulk gas feeds
2. compressor and post-reaction gas analyzer
3. bypass heat exchangers and post-make up gas analyzer
4. fluidized bed reactor and catalyst feed
5. product removal
6. water by-product removal
7. water treatment

SCP – Strong Patent Portfolio

- Comprehensive intellectual property protection:
  - Over 25 allowed Patents & 37 Patents published in the US
  - Broad international Patent filings – 34 issued patents
- US EPA Regulatory approval received: SNUR

► **US and International Patent filings (allowed and published)**

Noyes Process – Regulatory approval

US - EPA approval received 2017 to produce CNF/T with the Noyes Process.

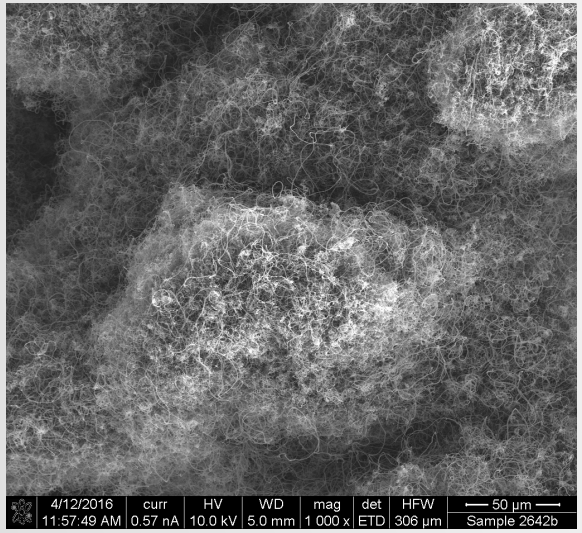
- Unlimited production capacity for SCP and SCP licensees. Precedent-setting for CNF/T production. In all other cases, the EPA has set a production cap subject to re-evaluation.
- 20 categories of uses permitted - one of the most expansive use lists ever permitted. These uses were written broadly enough to encompass potentially hundreds of applications.
- Discharge of process water to waters of the United States – can be repurposed for industrial or agricultural use. No other CNF/T manufacturer has this right.
- Disposal of solid waste by landfill – incineration not required.
- SCP not required to conduct an inhalation study, a cost savings of over 1 million dollars.

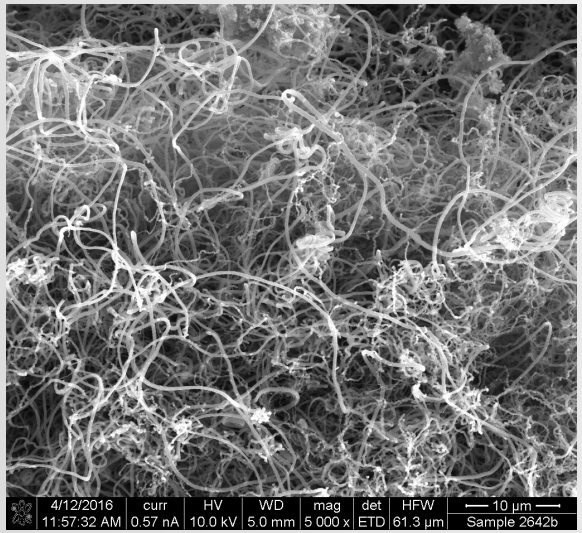
Next step: Europe – apply for REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) Certificate of Compliance

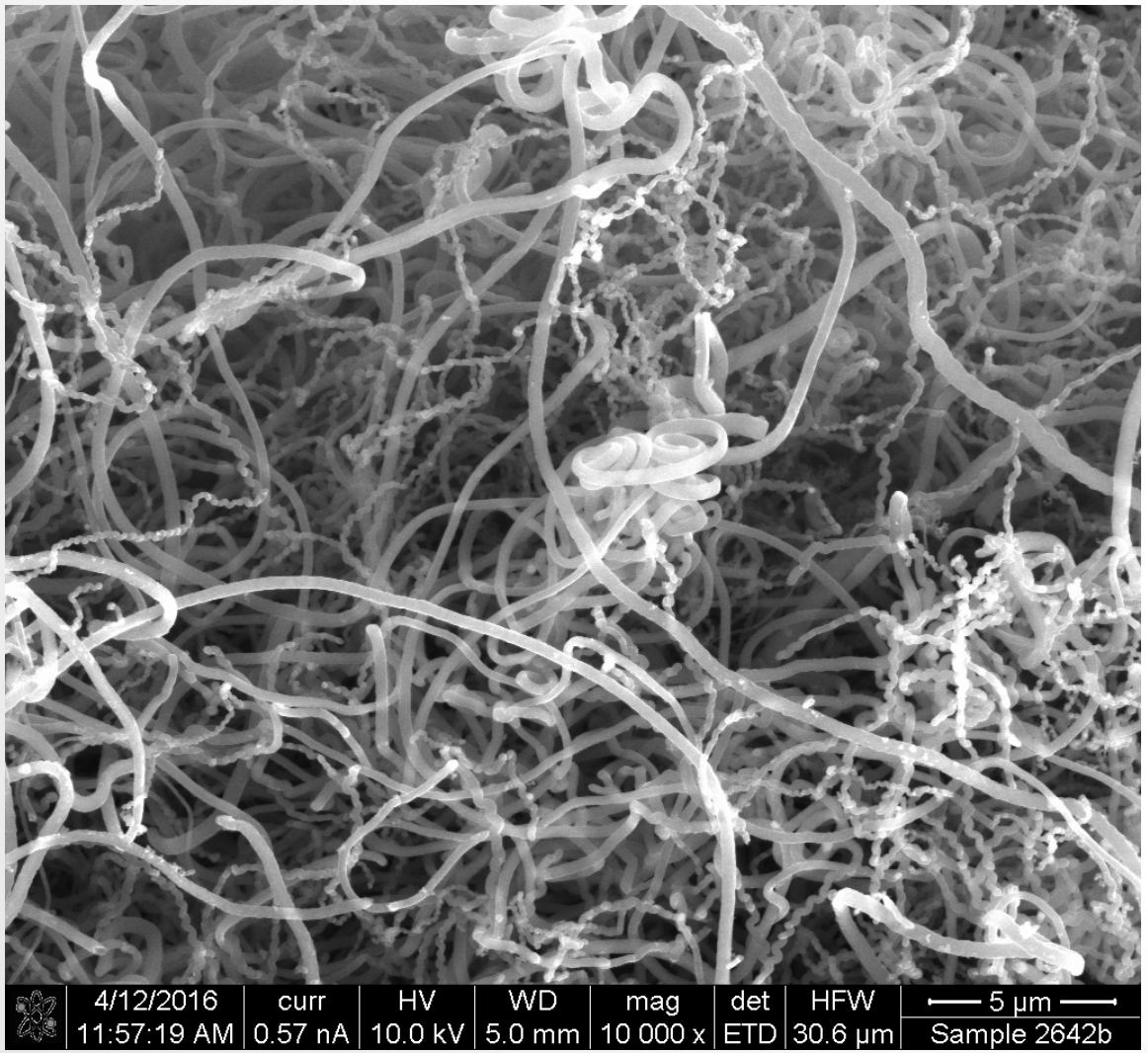
Improving Performance

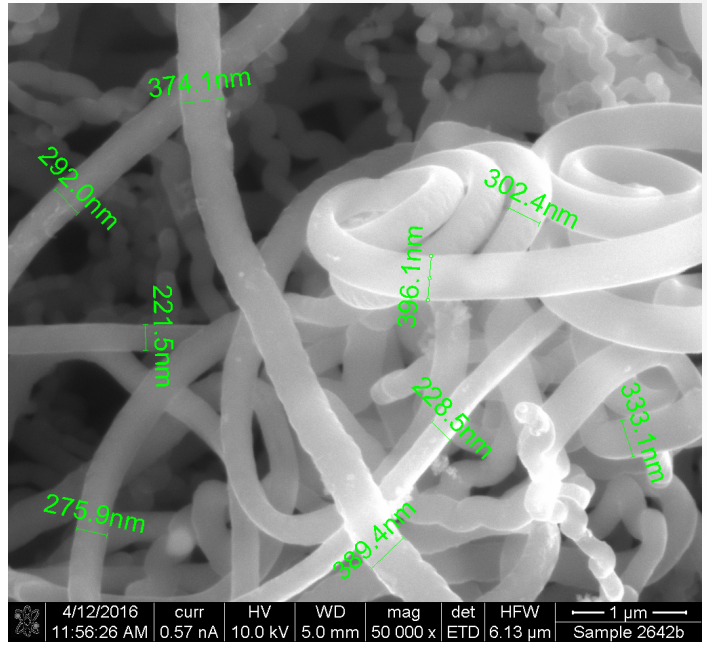
In composites and rubber

SCP Carbon Products – Carbon Fiber – SEM images









Carbon Fiber

- magnifications of 1K, 5K, 10K & 50K
- diving deeper on same sample.

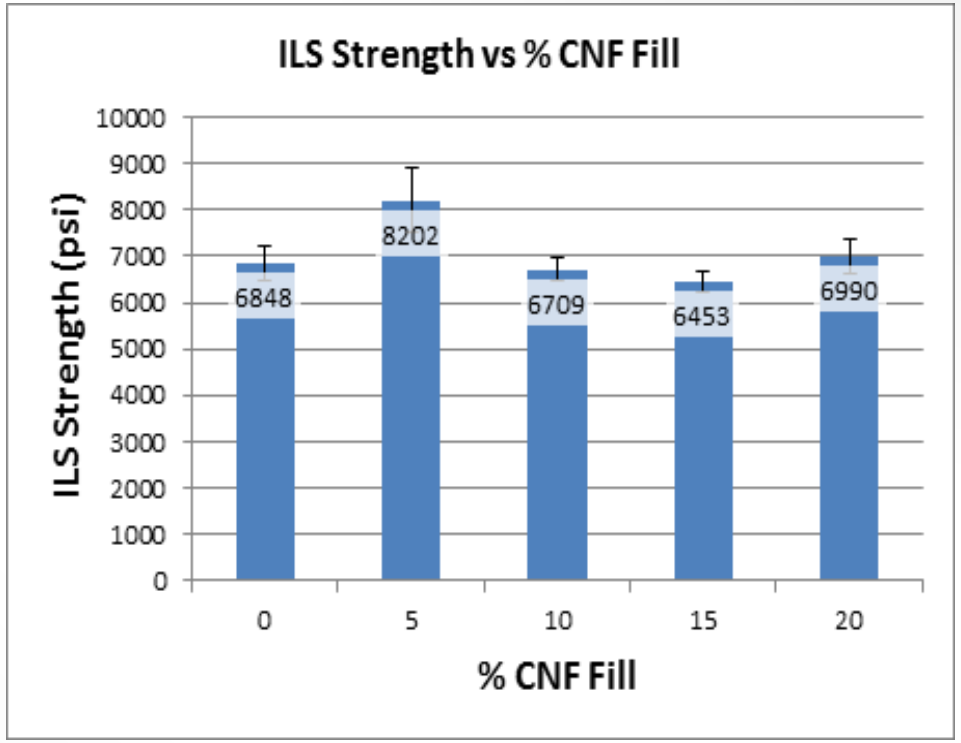
SCP CF/CNT – Interlaminar Shear - high performance additive

Noyes Carbon Fibers (CF) are different from the bulky, continuous, several μm (micrometer) diameter carbon fibers produced using PAN precursor.

Noyes CF are sp^2-based, high aspect ratio, graphitic-structured carbon filaments, with CF diameters ranging from 120 - 200 nm (typical for CF) to 20 - 50 nm (typical for the CNT).

Why are Noyes CF/CNT better at delivering strength in engineered composites?

- Provide reinforcement at the molecular level
- Have an aspect ratio that allows for efficient load transfer along their length
- CF/CNT size allows a good dispersion, which translates into a highly efficient structure



5% resin loading provided 17.9% increase in Interlaminar Shear (ILS) strength in tests at University of Utah

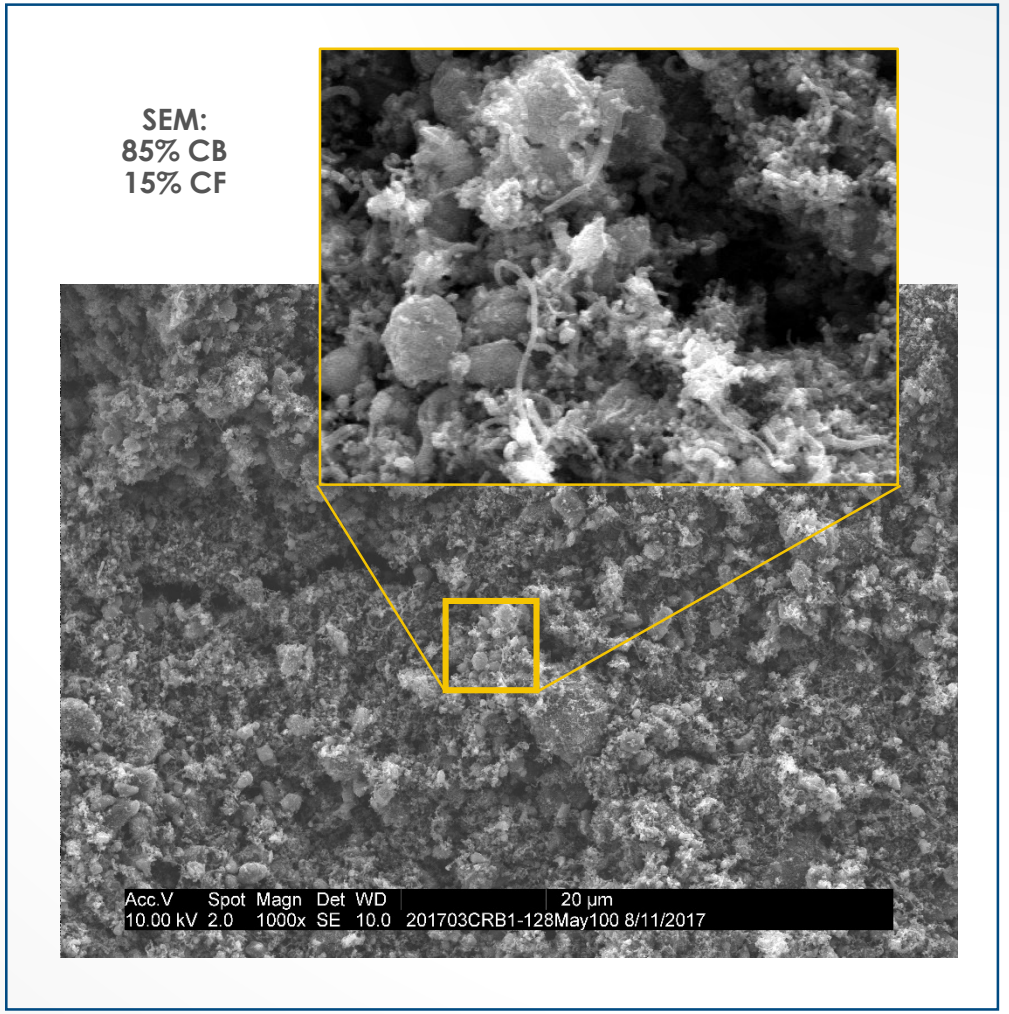
SCP Carbon Black/CF – in rubber/tires

In third party testing, SCP Carbon Black/Fiber blend (85/15) outperformed Carbon Black N234 (used for high performance tire treads) when compounded in natural rubber.

- SCP compounded rubber showed significantly higher elastic and viscous modulus
- SCP compounded rubber was dynamically stiffer than the N234 compound
- In combination these characteristics are important for high-performance, low rolling resistance tires

SCP's carbons have a graphitic structure leading to:

- Shorter cure times during tire manufacturing – vulcanizing (higher production rate)
- Improved heat dissipation in road use (longer tire life)



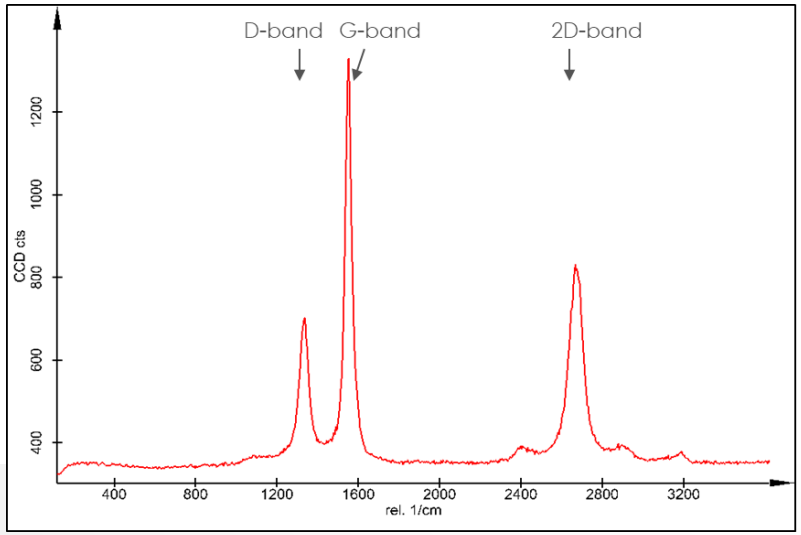
SCP Synthetic Graphite – lithium ion batteries

American Lithium Energy has been evaluating the new synthetic graphite produced by Solid Carbon Products LLC and Conductive Carbons LLC from nanoscale carbons made from CO2. In our opinion, this new synthetic graphite is particularly well suited as a performance additive to the anode chemistry of lithium ion batteries for electric vehicles and for rechargeable power tools.

American Lithium Energy values that this is domestically produced synthetic graphite, an important characteristic when supplying the US military. To the best of our knowledge there is no similar domestic supplier of battery-grade synthetic graphite in the US. This will tend to make this new synthetic graphite attractive to other battery manufacturers supplying the US military market.

Best regards,

J Fan, Ph. D
CEO, American Lithium Energy



Strong Partnerships in Development

CO_2 Producers	Carbon Producers	Carbon Users
Want higher profitability on their CO_2 product and a stronger CO_2 environmental impact	Want improved profitability in producing carbons and a stronger environmental impact Want higher profitability on their CO_2 product and a stronger CO_2 environmental impact	Want to differentiate their product by using "low CO_2 emission" carbon black, as well as benefit from the enhanced material properties

SCP – Ready to Commercialize

- **Technology:** Proven technology protected by a comprehensive and global patent portfolio.
- **Custom Materials** : By dialing in production process conditions, SCP is able to produce tailored carbons including carbon black and high aspect ratio, high performance additives that benefit plastics, polymers, metals, rubbers, cement, coatings and other global markets. The high aspect ratio carbons - carbon fiber/nanotubes (CF/CNT) perform like molecular–scale rebar, increasing the strength, allowing the reduction of the weight of engineered composites.
- **Performance**: In addition to the above microstructures, tailored carbons can also have graphitic-structure at the atomic level leading to highly thermally and electrically conductive materials, enabling new automotive and electronic applications.
- **Economics:** Production at **50 tons per month is highly profitable when converting the carbon to synthetic graphite.** Our preliminary cost of production estimates (COGS) lead to 30% to 50% gross margins on the carbon blacks when produced at commercial scale (5,000 tpm and greater), with much higher margins on the synthetic graphite.

Solid Carbon Products LLC

Thank you

If you would like further information,
or *to start due diligence as a strategic partner*,
please contact me.

Gay Wyn Quance
CEO and President
gwquance@solidcarbonproducts.com
www.solidcarbonproducts.com