

CARBON FOR ELECTRONICS



OVERVIEW

Unidym, Inc. is developing high quality, carbon-based materials, processes, and devices for the electronics industry. The Company's initial product is a transparent, conductive film of randomly dispersed carbon nanotubes (CNTs) targeted for the touch screen, flat panel display, OLED, and thin-film solar industries. The film is deposited via solution-based, roll-to-roll compatible processes and offers significant cost savings and performance advantages over the industry standard Indium Tin Oxide (ITO) films, including: improved mechanical robustness for longer lifetimes, a broader and more color-neutral transmittance than ITO, ability to reach higher levels of sheet resistance without losing uniformity, and lower costs. The Company is also developing carbon nanotube-based thin-film transistors (TFTs) and conductive inks for printable electronics applications. Unidym differentiates itself through its emphasis on:

- Robust materials processing
- In-house and proprietary carbon nanotube production
- Aggressive partnership strategy
- foundational intellectual property portfolio covering a wide variety of production techniques and applications for CNTs

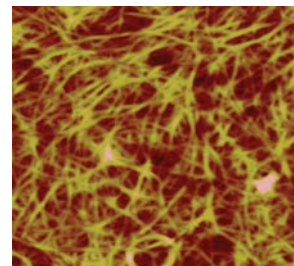
Unidym is actively seeking partners to enhance its commercialization efforts.

TECHNOLOGY PLATFORM

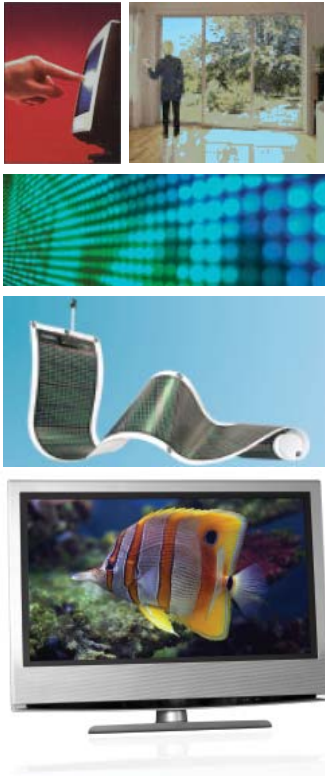
Unidym has a substantial expertise in the application of carbon nanoscale materials to the electronics industry. The Company's technology platform is comprised of three key capabilities:

Materials– Unidym produces CNTs for its current applications using an in-house proprietary, chemical vapor deposition (CVD) process. Unidym's use of CVD differentiates it from many of its competitors which employ cumbersome, low-throughput CNT fabrication methods. Unidym's carbon nanotubes offer conductivity, mechanical stability, and superior environmental resistance in numerous applications.

Architecture– Unidym's production process ensures an optimally dispersed, random network of carbon nanotubes that offers high electrical conductivity, excellent mechanical flexibility, and high transparency in a uniform film.



INITIAL APPLICATIONS



Sample applications for transparent, conductive films

High Speed, Solution-Based Processing– Current deposition methods for ITO and other electronic materials are largely based on high temperature, vacuum-based processes requiring large capital costs and relatively low throughput. In contrast, Unidym employs high throughput, solution-based processes capable of uniformly coating large areas at high speeds using conventional coating and printing technologies. A variety of rigid (e.g., glass, polymer, silicon) and flexible polymer substrates are readily coated with Unidym's CNT inks.

Unidym's transparent, conductive films, fabricated via room temperature processes, offer significant benefits for a wide variety of applications.

Touch Screens– Unidym CNT transparent conductive films for touch panels enable –

- Substantially improved durability/wear resistance
 - CNT film offering : 5 wire durability with 4 wire product/cost
- Improved daylight readability for outdoor application (e.g. mobile handsets, POS, etc.)
 - Reduced reflection
- Significantly higher production capacity with 50-100X faster deposition speed than ITO
 - Greatly reduce lead times
- Cost effective dry etch patterning option
 - Ability to remove acid based wet etching from your manufacturing flows
- Ability to coat on emerging rigid plastic
 - Provide rigid polycarbonate (PC) as an electrode – no need for F-F on backer plates or glass
- Improved productivity
 - Reduce your manufacturing steps and simplify device architectures
- Truly flexible electrodes
 - Don't crack – in the fab OR during customer's use

Flat Panel Displays– Unidym's Carbon nanotube films offer substantial cost reduction and yield benefits to flat panel display manufacturers –

- Higher yield and productivity
 - Low temperature CNT deposition limits out-gassing, increases throughput
 - Substantial reduction in defects, which come from ITO sputtering and patterning
- CNT deposition at ambient conditions
 - No vacuum deposition
- Environmentally benign (dry etch) process for patterning
 - Wet etchant for ITO is a strong acid. (Environmental problem of chemical waste)
- Improved manufacturability
 - Reduction in process steps (mask reductions) and TACT time
- Flatter transmission curve
 - Better image quality
- Higher uniformity
 - Ensuring better uniformity than ITO due to proprietary coating and deposition process
 - Conformal coatings on non-planar surfaces
- Substantial Cost Reduction
 - Reduction in capital as well as variable cost