



TECH TO BUSINESS

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Flexible, Free-Standing NanoPorous Carbon Films

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Background

Nanostructured carbon is an attractive material due to its tunable chemical, electrical and physical properties. This low costs, electrical conductivity, high surface area, material offer distinct advantages over other support materials. Current research on these materials includes sorption and storage of liquids and gases, super-capacitor energy storage, fuel cells, gas microsensors, protein detection and filtration. However, most nanostructured carbon materials are in powder-form, which limits some of their applications. Polymeric binders are often to address the powder nature of the nanoscopic carbon. These binders, however, often impair the conductivity or mass transfer properties, thus lowering performance.

Technology

Researchers at the University of Calgary have invented *a new synthetic method to produce free-standing, flexible nanoporous carbon films* from non-toxic, cheap, commercially available starting materials. Using a patent pending method, large-area films of *variable thickness* can be created with *tunable pore size/distributions* tailored for the desired application. The *free-standing, strong and flexible* nature of the films would readily enable mass production fabrication techniques, such as roll-to-roll processing (Figure 1). These nanoscopic films have *very high surface areas* that can be *readily modified* with catalysts and functional groups for post-modification for a variety of industrial applications such as fuel cells, gas sensors, filtration and chromatographic materials, etc.

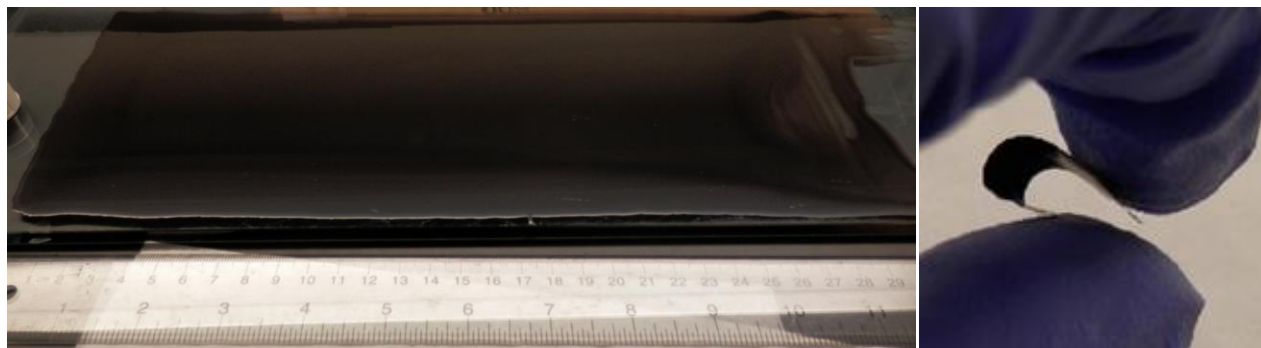


Figure 1. (Left) Large area thin film; (Right) Demonstration of the free-standing and flexible nature of the film.



Areas of Application

- Electrode supports for Proton Exchange Membrane Fuel Cells
- Support material for catalysts
- Filtration/Chromatographic materials
- Batteries
- Gas Sensors
- Sorption materials

Competitive Advantages

- Flexible and scalable production of films → amenable to roll to roll processing
- Tunable and controllable distribution of micro- and nano-pores
- Tunable high surface area ($> 620 \text{ m}^2 \cdot \text{g}^{-1}$)
- Good conductivities ($10 \text{ S} \cdot \text{cm}^{-1}$)
- High capacitance ($> 88 \text{ F} \cdot \text{g}^{-1}$)
- Not a powder → does not need further processing to be incorporated in device and less health risks

Intellectual Property Status

- Patent filed