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### High Performance Supercapacitor Device Based on Polymer Derived Carbon Nanofiber with Enhanced Capacity at Elevated Temperatures

Charith Ranaweera  
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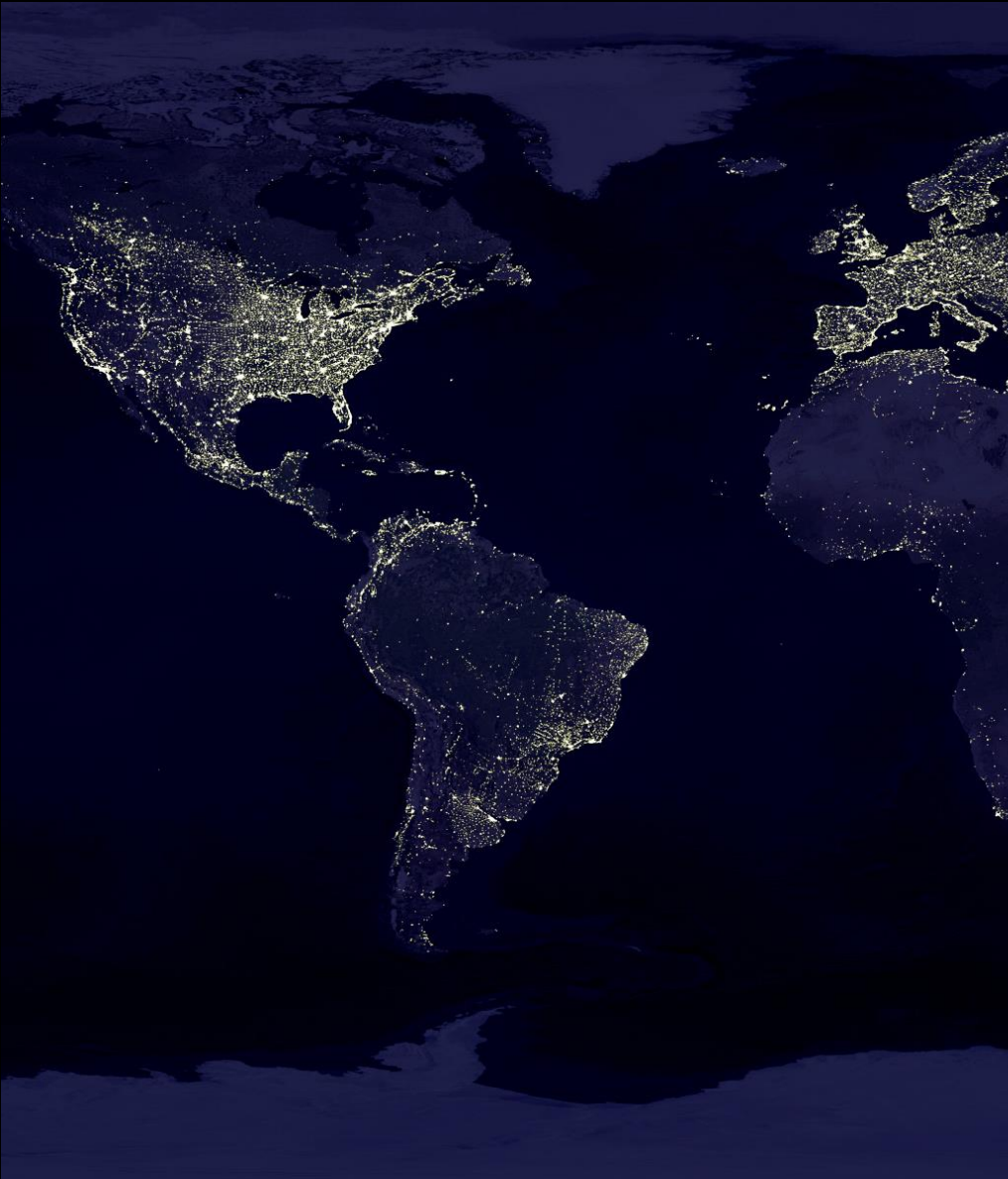
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“Earth’s city lights” image by NASA

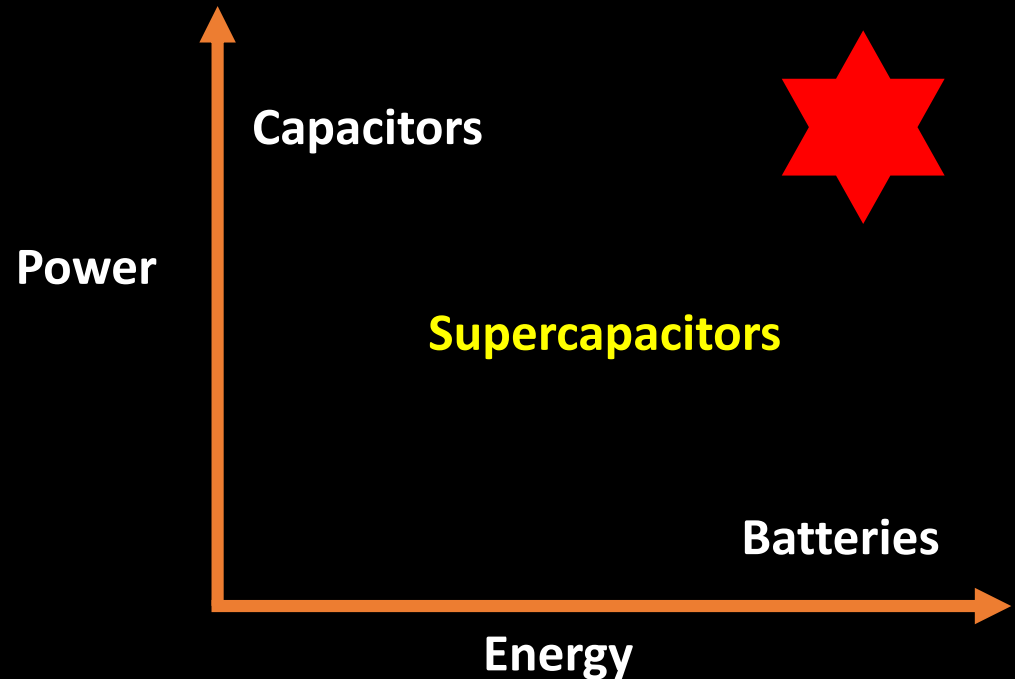


# **Polymer derived carbon nanofiber embedded cobalt oxide for efficient supercapacitors**

**C.K. Ranaweera, S. Bhoyate, C.  
Zhang, P. K. Kahol, R. Gupta**

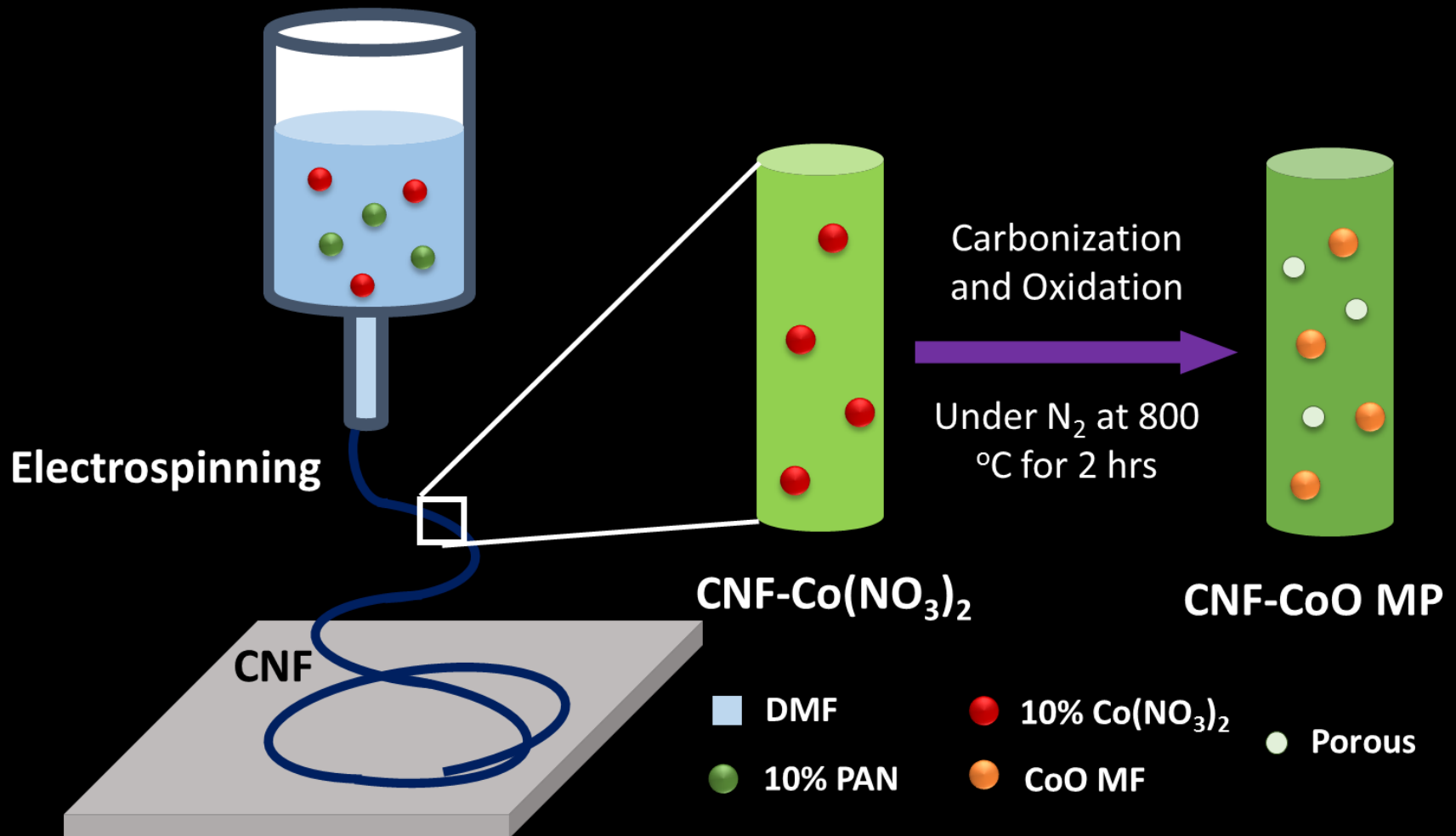
**Presented by  
Charith K. Ranaweera**

# Supercapacitors for energy storage

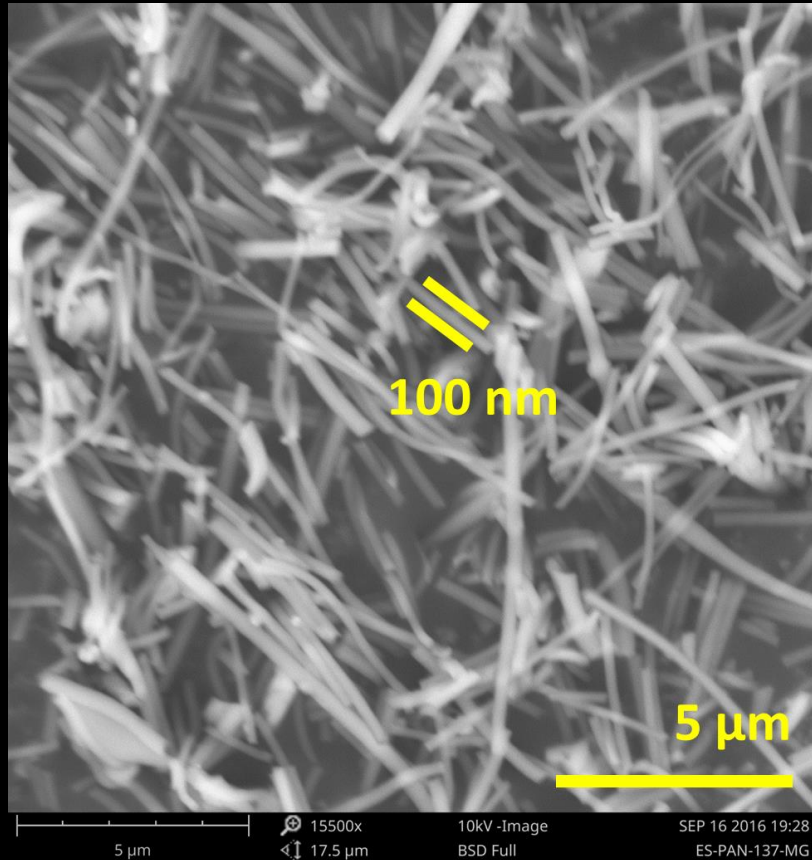


- Pulse power supply
- Rapid charging time
- Outstanding service life
- Operational safety

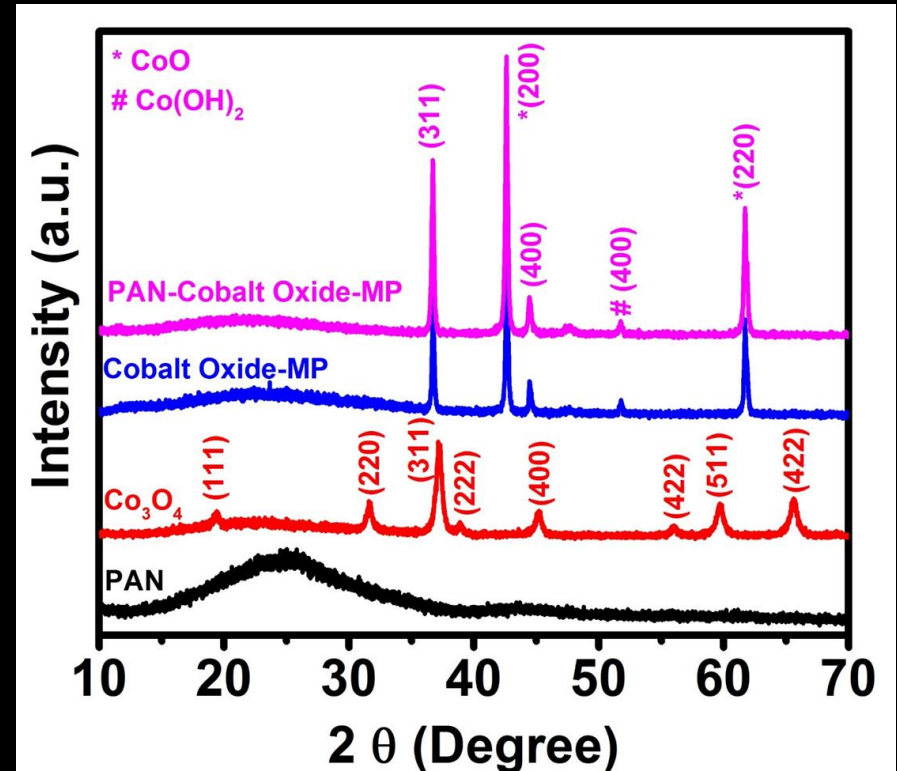
# Synthesis of cobalt embedded carbon nano fibers



# Microstructure of cobalt embedded carbon nano fibers

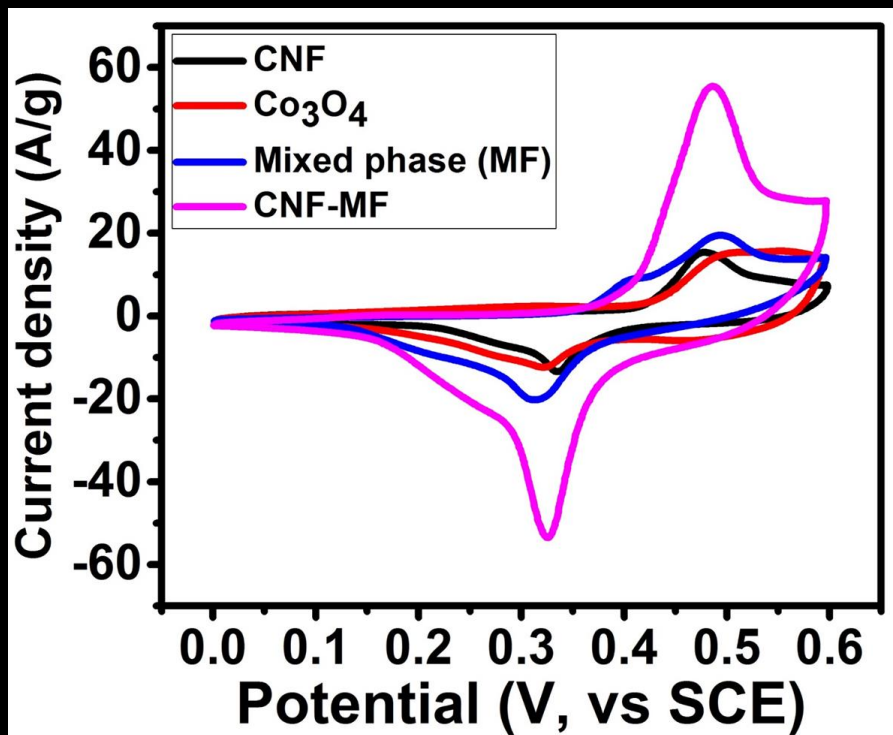


Diameter of the carbon nano fibers are around 100 nm

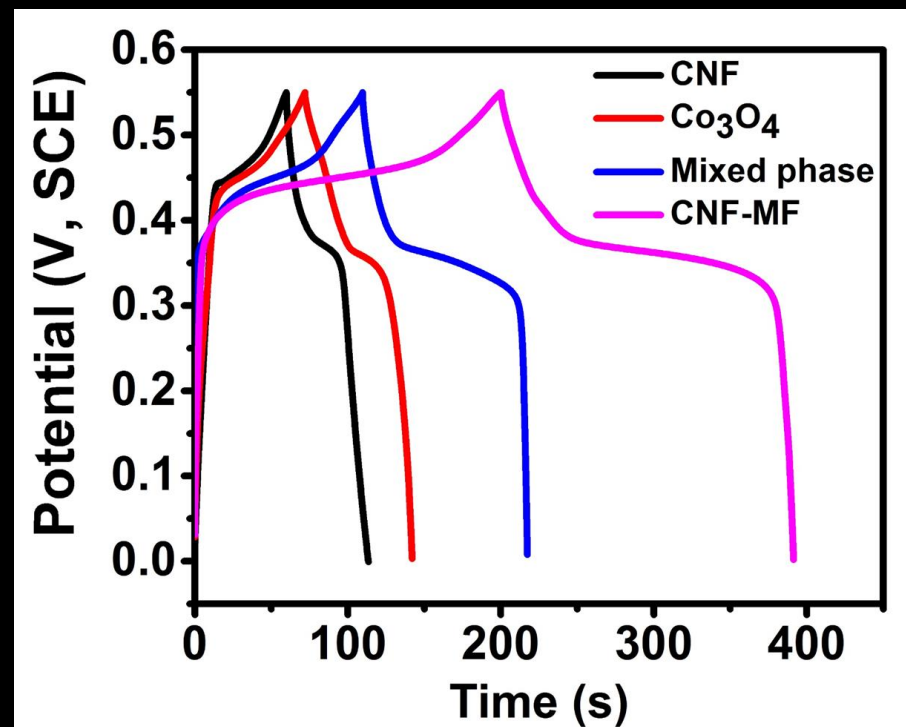


XRD spectra of highly crystalline cobalt oxides, amorphous CNF, and their composites

# Capacitive performance of cobalt embedded carbon nano fibers



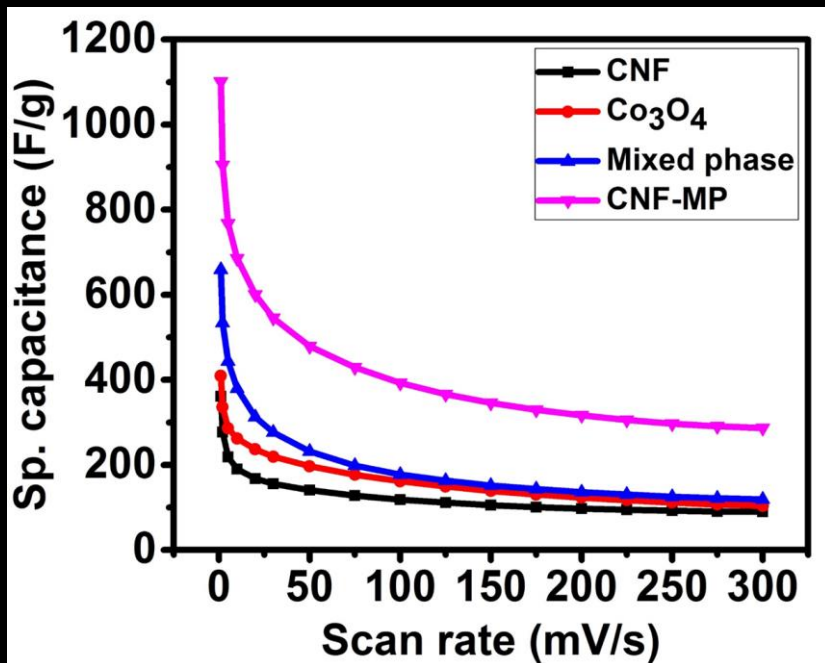
Cyclic voltammetry curves at 50 mV/s



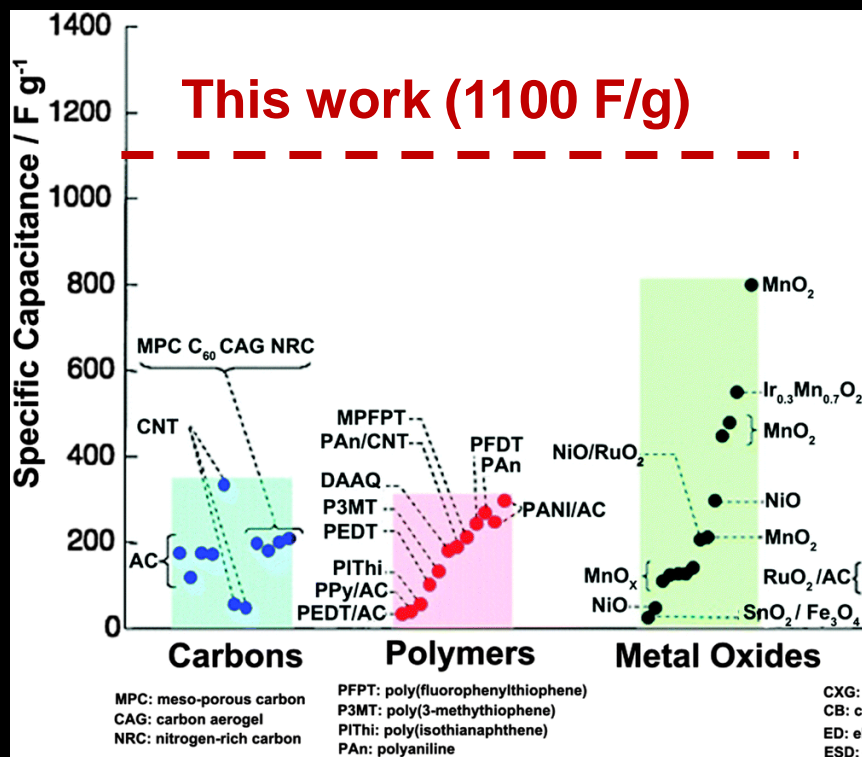
Charge-discharge profiles at 1 A/g



# Capacitive performance of cobalt embedded carbon nano fibers

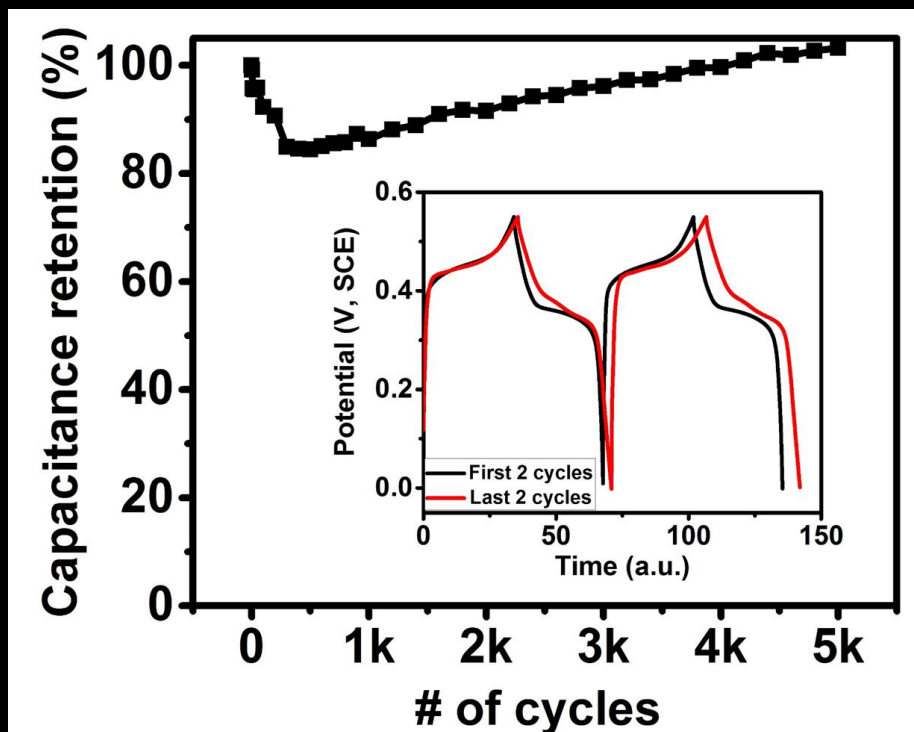


Variation of specific capacitance vs scan rates

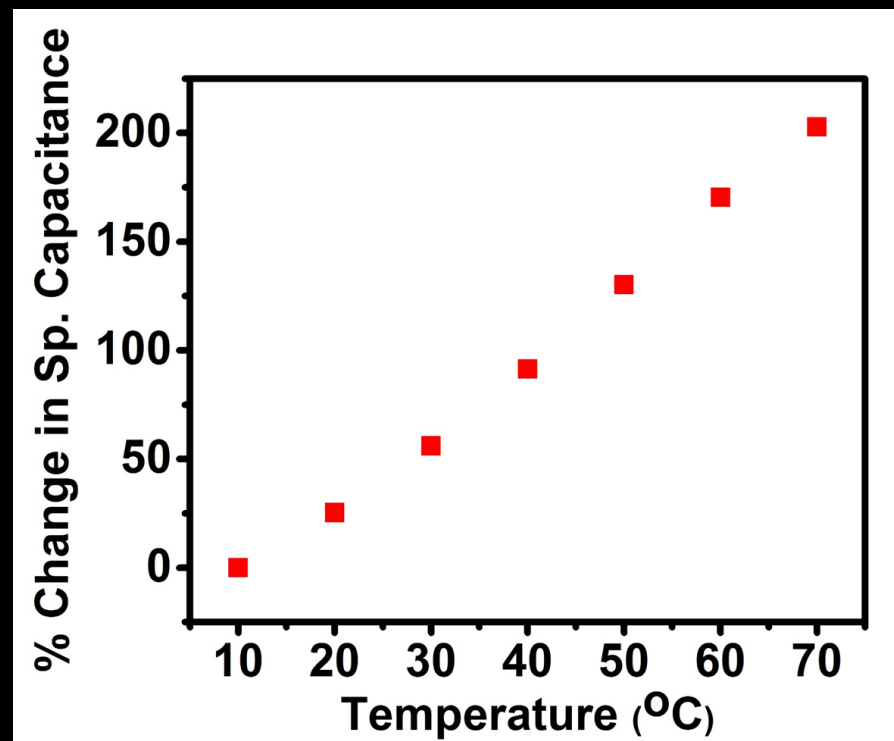


Sp. capacitance of proposed supercapacitor materials in literature

# Cyclic and temperature stability of cobalt embedded carbon nano fibers



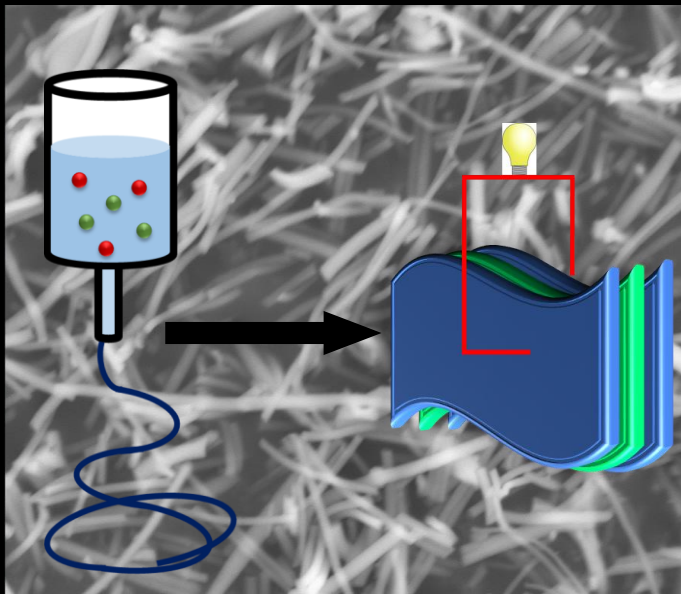
Long term cyclic stability test



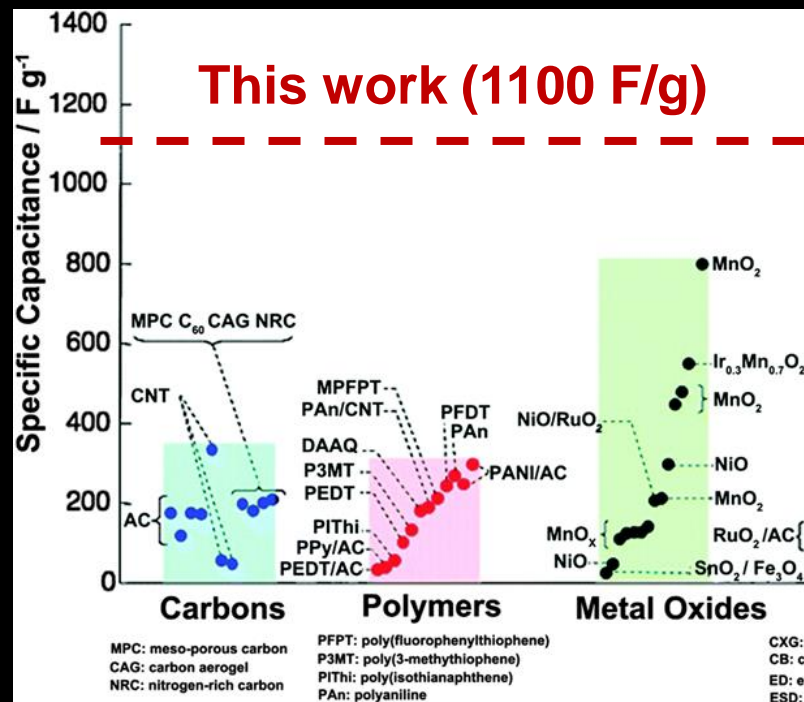
Performance at elevated temperatures



# Summary



- Embedding of cobalt oxides to CNF enhance the capacitance of CNF by 3 folds



- Perfect long term life time stability over 5k cycles
- Improved capacitive performance at elevated temperatures

**THANK YOU.....**

**DO YOU HAVE ANY QUESTIONS ?**

