

Advanced Carbon Materials Inc.

Carbon Felt made of Recycled Aircraft Parts

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ACM Introduction

Based in Tokyo Japan, ACM was established in Dec 16th 2015, starting to do global trading of carbonaceous materials.

Fast forwarding to the year 2025, we have set up a semi commercial plant and launched numerous sustainable chemicals and materials.

Redox Flow Battery Electrode

Current Supply Chain vs. Recycled Product Supply Chain

Advantages of Recycled Product Supply Chain

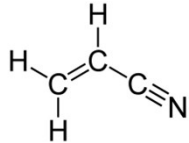
- Lower Cost(1/3) and Ample Supply
- Feedstock Quality Control under EASA or FAA standards

Raw Materials

Intermediate Products

Applications

Conventional Process



Acrylonitrile



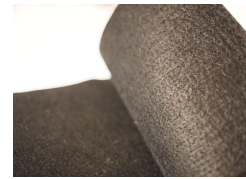
PAN Fiber



Pre-Ox



Pre-Ox Crimped Fiber



Pre-Ox Felt



Carbon Felt



Raw Materials

Intermediate Products

ACM's



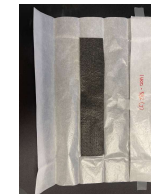
Aircraft Brake Preform



Carded Fiber



Pre-Ox Felt

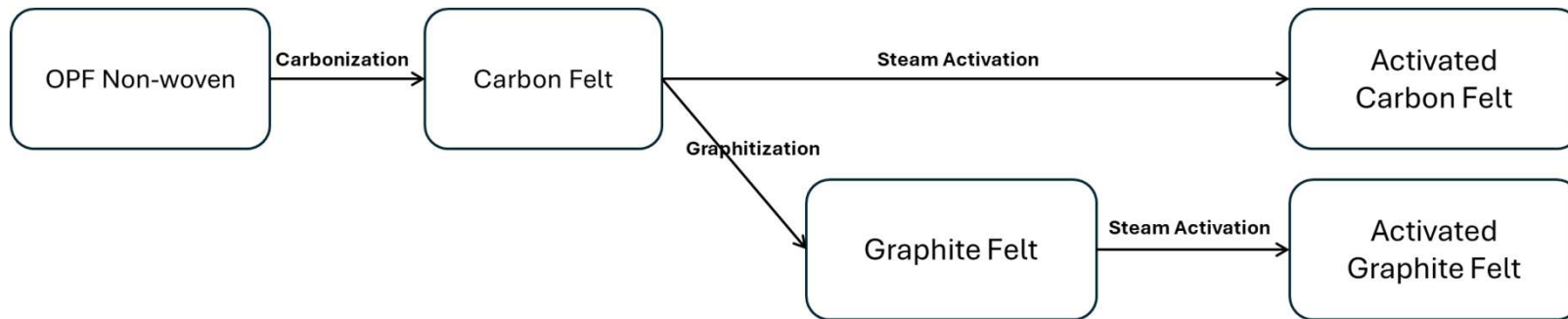


Carbon Felt

Experiment and Results

Sample: Oxidized Polyacrylonitrile Fiber Felt
 Areal Weight: 150 g/m²
 Density: 1.38 g/cm²

Overall Process of Carbonization and Graphitization

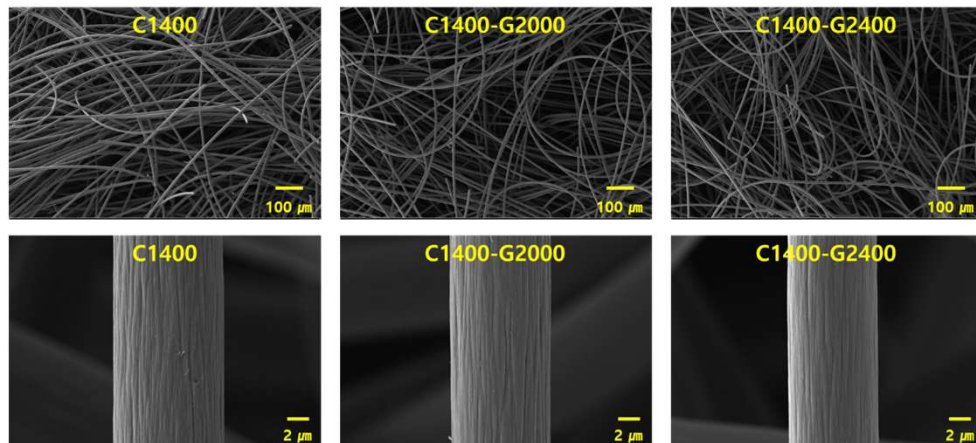


Weight Loss and Shrinkage After Carbonization / Graphitization

Average Remaining Weight (%) for Carbonization to 1400 °C	Average Remaining Weight (%) from 1400 °C to Graphitization to 2000 °C	Average Remaining Weight (%) from 1400 °C to Graphitization to 2400 °C	Average Shrinkage (%) from OPF Non-woven to Carbonization(or Graphitization)
60.07	78.45	77.83	10~15

Experiment and Results

SEM Analysis of the Carbon Felt and Graphite Felt(s)



Density Analysis

Sample Name	Density (g/cm ³)
C1400	1.8221
C1400-G2000	1.7964
C1400-G2400	1.8405

Elemental Analysis through CHNO (Carbon Content %)

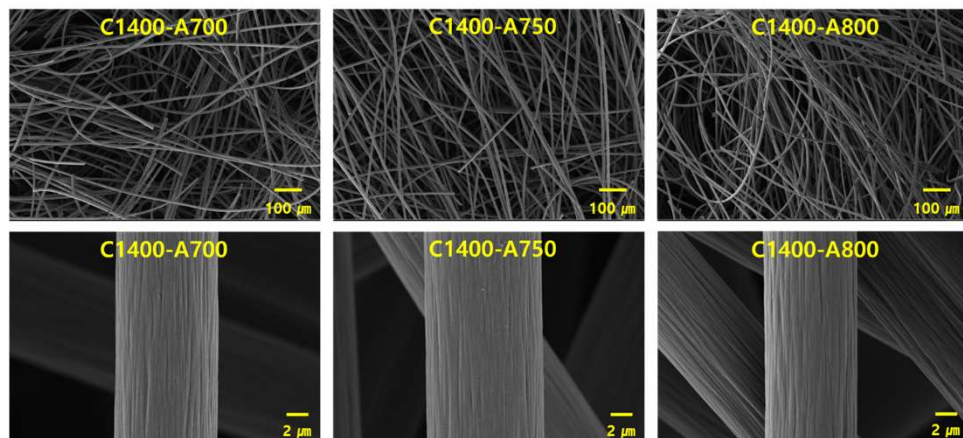
Sample Name	C(%)	H(%)	N(%)	S(%)	O(diff.)* (%)
C1400	78.4	1.2	12.4	0.6	7.5
C1400-G2000	97.9	0.0	1.2	0.6	0.4
C1400-G2400	96.9	0.0	0.9	0.6	1.6

XPS analysis (Functional Group(s))

Sample Name	C1s (%)	O1s (%)	N1s (%)
C1400	78.018	16.412	5.572
C1400-G2000	94.983	3.142	1.875
C1400-G2400	96.646	2.582	0.826

Experiment and Results (Activation)

SEM Analysis of the Activated Carbon Felt and Graphite Felt(s)



Surface Activation Results (Weight Change (%)):

Sample No.	Sample Name	Activation Condition (Temp. / Time in Hour)	Remaining Weight (%) after Activation
1	C1400-A700	700 °C / 1h	93
2	C1400-A750	750 °C / 1h	80
3	C1400-A800	800 °C / 1h	58
4	C1400-A900	900 °C / 1h	5
5	C1400-G2000- A1000(1H)	1000 °C / 1h	86
6	C1400-G2000- A1000(2H)	1000 °C / 2h	66
7	C1400-G2400- A1000(1H)	1000 °C / 1h	90
8	C1400-G2400- A1000(2H)	1000 °C / 2h	79

BET Analysis

Sample Name	C1s (%)	O1s (%)	N1s (%)
C1400-A700	82.228	9.372	8.396
C1400-A750	85.662	6.526	7.810
C1400-A800	83.890	8.724	7.384

XPS analysis (Functional Group(s))

Sample Name	C1s (%)	O1s (%)	N1s (%)
C1400-A700	82.228	9.372	8.396
C1400-A750	85.662	6.526	7.810
C1400-A800	83.890	8.724	7.384

Conclusions and Next Steps

- Recycled Carbon Felt is feasible, affordable for the upcoming demands of Flow Batteries application
- Looking for partners(users) and sponsors for setting up a semi commercial plant

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