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APPENDIX

Appendix A Electrical Conductivities of Partially Ordered Carbon and Activated Carbon

The electrical conductivity values of the partially ordered carbons were measured the resistances which obtained from C-V plot and calculated the electrical conductivity. The electrical conductivity of the partially ordered carbon was observed at room temperature by an electrometer with two-point probe (Keithley model 6517A).

Table A1 The results of the measurement of currents with various voltages (NC-MDA 500-1)

Volt	Current (A)			
(V)	1	2	3	Average
0.10	2.17E-09	2.17E-09	2.17E-09	2.17E-09
0.20	4.36E-09	4.36E-09	4.36E-09	4.36E-09
0.30	6.58E-09	6.58E-09	6.58E-09	6.58E-09
0.40	8.76E-09	8.76E-09	8.76E-09	8.76E-09
0.50	1.10E-08	1.10E-08	1.10E-08	1.10E-08

Table A2 The results of the measurement of currents with various voltages (NC-MDA 500-2)

Volt	Current (A)			
(V)	1	2	3	Average
0.30	2.18E-09	2.15E-09	2.17E-09	2.17E-09
0.50	3.52E-09	3.48E-09	3.51E-09	3.50E-09
0.70	4.85E-09	4.84E-09	4.85E-09	4.85E-09
0.90	6.22E-09	6.22E-09	6.22E-09	6.22E-09
1.00	6.92E-09	6.93E-09	6.92E-09	6.92E-09

Table A3 The results of the measurement of currents with various voltages (NC-MDA 500-3)

Volt	Current (A)			
(V)	1	2	3	Average
0.80	2.15E-09	2.16E-09	2.16E-09	2.16E-09
0.90	2.47E-09	2.46E-09	2.47E-09	2.47E-09
1.00	2.67E-09	2.68E-09	2.67E-09	2.67E-09
1.20	3.28E-09	3.28E-09	3.28E-09	3.28E-09
1.40	3.82E-09	3.81E-09	3.82E-09	3.82E-09

Table A4 The results of the measurement of currents with various voltages (NC-MDA 800-1)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	1.25E-03	1.26E-03	1.26E-03	1.25E-03
0.02	3.30E-03	3.30E-03	3.30E-03	3.30E-03
0.03	4.84E-03	4.83E-03	4.83E-03	4.83E-03
0.04	6.39E-03	6.39E-03	6.39E-03	6.39E-03
0.05	7.95E-03	7.95E-03	7.95E-03	7.95E-03

Table A5 The results of the measurement of currents with various voltages (NC-MDA 800-2)

Volt	Current (A)			
(V)	1	2	3	Average
0.004	6.05E-04	5.99E-04	6.10E-04	6.05E-04
0.006	2.02E-03	2.04E-03	2.03E-03	2.03E-03
0.008	2.04E-03	2.03E-03	2.03E-03	2.03E-03
0.010	2.02E-03	2.04E-03	2.10E-03	2.05E-03
0.012	2.52E-03	2.52E-03	2.52E-03	2.52E-03

Table A6 The results of the measurement of currents with various voltages (NC-MDA 800-3)

Volt	Current (A)			
(V)	1	2	3	Average
0.0008	6.39E-04	6.39E-04	6.45E-04	6.41E-04
0.0010	6.48E-04	6.47E-04	6.56E-04	6.50E-04
0.0020	6.51E-04	6.51E-04	6.66E-04	6.56E-04
0.0050	1.19E-03	1.19E-03	1.20E-03	1.19E-03

Table A7 The results of the measurement of currents with various voltages (NC-MDA 1200-1)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	3.55E-03	3.54E-03	3.54E-03	3.54E-03
0.02	5.18E-03	5.17E-03	5.17E-03	5.17E-03
0.03	7.57E-03	7.58E-03	7.58E-03	7.58E-03
0.04	1.00E-02	1.00E-02	1.00E-02	1.00E-02
0.05	1.17E-02	1.18E-02	1.18E-02	1.18E-02

Table A8 The results of the measurement of currents with various voltages (NC-MDA 1200-2)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	3.60E-03	3.59E-03	3.59E-03	3.59E-03
0.02	5.26E-03	5.23E-03	5.23E-03	5.24E-03
0.03	7.66E-03	7.67E-03	7.67E-03	7.67E-03
0.04	1.01E-02	1.01E-02	1.01E-02	1.01E-02
0.05	1.17E-02	1.18E-02	1.18E-02	1.18E-02

Table A9 The results of the measurement of currents with various voltages (NC-MDA 1200-3)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	3.79E-03	3.80E-03	3.80E-03	3.80E-03
0.02	5.51E-03	5.52E-03	5.51E-03	5.51E-03
0.03	8.05E-03	8.05E-03	8.05E-03	8.05E-03
0.04	1.06E-02	1.06E-02	1.06E-02	1.06E-02
0.05	1.17E-02	1.19E-02	1.19E-02	1.18E-02

Table A10 The results of the measurement of currents with various voltages (AC-MDA 500-1)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	2.21E-03	2.21E-03	2.21E-03	2.21E-03
0.02	3.22E-03	3.21E-03	3.22E-03	3.22E-03
0.03	4.70E-03	4.69E-03	4.70E-03	4.70E-03
0.04	6.17E-03	6.17E-03	6.17E-03	6.17E-03
0.05	7.66E-03	7.66E-03	7.67E-03	7.66E-03

Table A11 The results of the measurement of currents with various voltages (AC-MDA 500-2)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	2.48E-03	2.47E-03	2.48E-03	2.48E-03
0.02	3.62E-03	3.62E-03	3.62E-03	3.62E-03
0.03	5.29E-03	5.28E-03	5.28E-03	5.28E-03
0.04	6.95E-03	6.95E-03	6.94E-03	6.95E-03
0.05	8.61E-03	8.61E-03	8.61E-03	8.61E-03

Table A12 The results of the measurement of currents with various voltages (AC-MDA 500-3)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	3.11E-03	3.08E-03	3.08E-03	3.09E-03
0.02	4.50E-03	4.51E-03	4.50E-03	4.50E-03
0.03	6.58E-03	6.57E-03	6.58E-03	6.58E-03
0.04	8.65E-03	8.64E-03	8.65E-03	8.64E-03
0.05	1.07E-02	1.07E-02	1.08E-02	1.07E-02

Table A13 The results of the measurement of currents with various voltages (AC-MDA 800-1)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	2.89E-03	2.90E-03	2.89E-03	2.89E-03
0.02	4.22E-03	4.22E-03	4.22E-03	4.22E-03
0.03	6.20E-03	6.18E-03	6.18E-03	6.19E-03
0.04	8.19E-03	8.18E-03	8.18E-03	8.18E-03
0.05	1.02E-02	1.02E-02	1.02E-02	1.02E-02

Table A14 The results of the measurement of currents with various voltages (AC-MDA 800-2)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	2.24E-03	2.23E-03	2.23E-03	2.23E-03
0.02	3.37E-03	3.37E-03	3.37E-03	3.37E-03
0.03	5.04E-03	5.04E-03	5.04E-03	5.04E-03
0.04	6.76E-03	6.74E-03	6.74E-03	6.74E-03
0.05	8.38E-03	8.38E-03	8.39E-03	8.38E-03

Table A15 The results of the measurement of currents with various voltages (AC-MDA 800-3)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	2.71E-03	2.71E-03	2.72E-03	2.71E-03
0.02	4.03E-03	4.04E-03	4.04E-03	4.04E-03
0.03	5.99E-03	5.98E-03	5.99E-03	5.98E-03
0.04	7.96E-03	7.95E-03	7.95E-03	7.95E-03
0.05	9.94E-03	9.93E-03	9.93E-03	9.93E-03

Table A16 The results of the measurement of currents with various voltages (AC-MDA 1200-1)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	3.27E-03	3.22E-03	3.23E-03	3.24E-03
0.02	4.69E-03	4.68E-03	4.68E-03	4.68E-03
0.03	6.81E-03	6.80E-03	6.80E-03	6.80E-03
0.04	8.95E-03	8.93E-03	8.93E-03	8.94E-03
0.05	1.11E-02	1.10E-02	1.10E-02	1.10E-02

Table A17 The results of the measurement of currents with various voltages (AC-MDA 1200-2)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	3.40E-03	3.41E-03	3.41E-03	3.41E-03
0.02	4.96E-03	4.94E-03	4.95E-03	4.95E-03
0.03	7.21E-03	7.21E-03	7.21E-03	7.21E-03
0.04	9.47E-03	9.46E-03	9.46E-03	9.47E-03
0.05	1.17E-02	1.17E-02	1.17E-02	1.17E-02

Table A18 The results of the measurement of currents with various voltages (AC-MDA 1200-3)

Volt	Current (A)			
(V)	1	2	3	Average
0.01	3.50E-03	3.47E-03	3.47E-03	3.48E-03
0.02	5.04E-03	5.05E-03	5.05E-03	5.04E-03
0.03	7.35E-03	7.32E-03	7.33E-03	7.34E-03
0.04	9.65E-03	9.64E-03	9.65E-03	9.65E-03
0.05	1.19E-02	1.19E-02	1.19E-02	1.19E-02

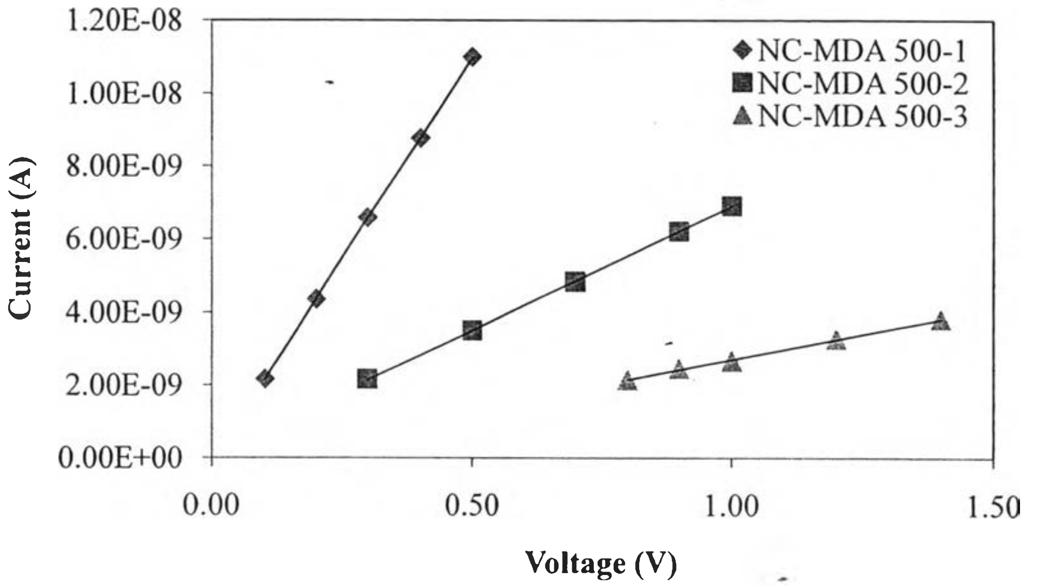

Figure A1 The slopes (1/resistance) of C-V plots of NC-MDA 500.

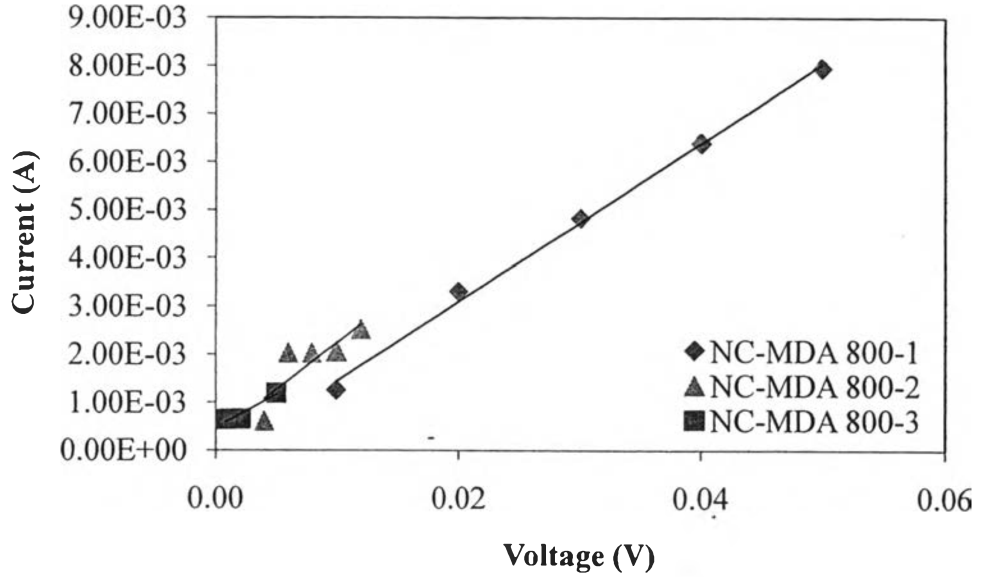

Figure A2 The slopes (1/resistance) of C-V plots of NC-MDA 800.

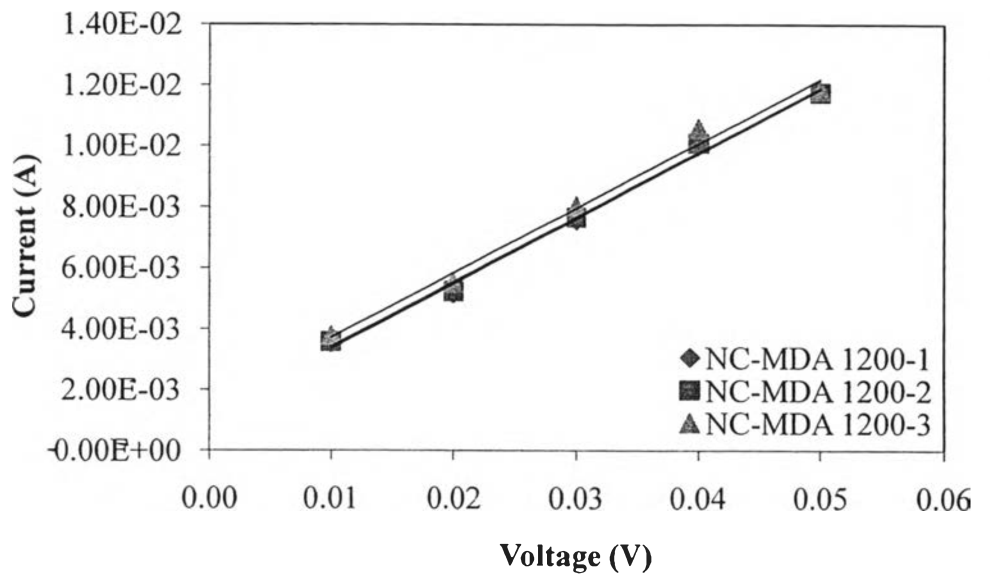

Figure A3 The slopes (1/resistance) of C-V plots of NC-MDA 1200.

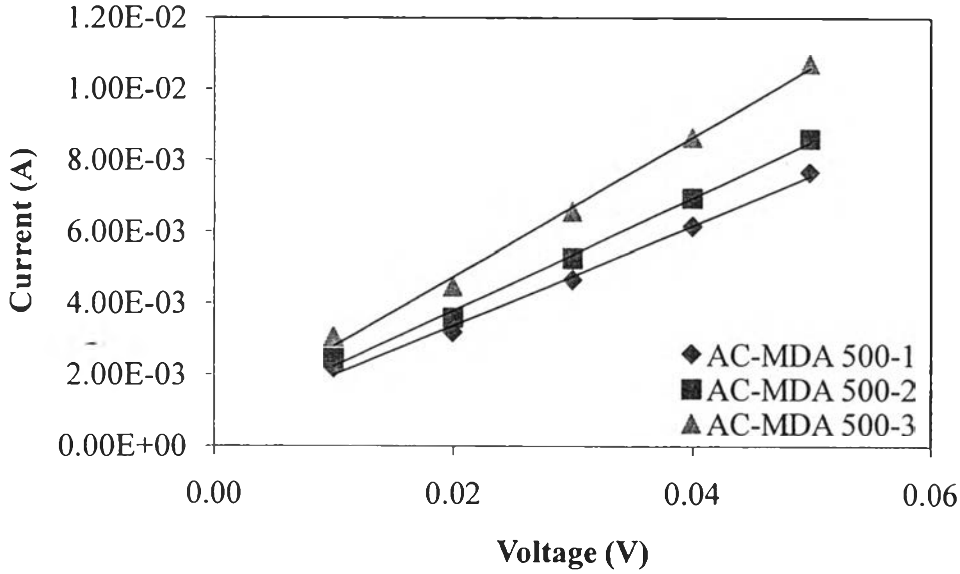

Figure A4 The slopes (1/resistance) of C-V plots of AC-MDA 500.

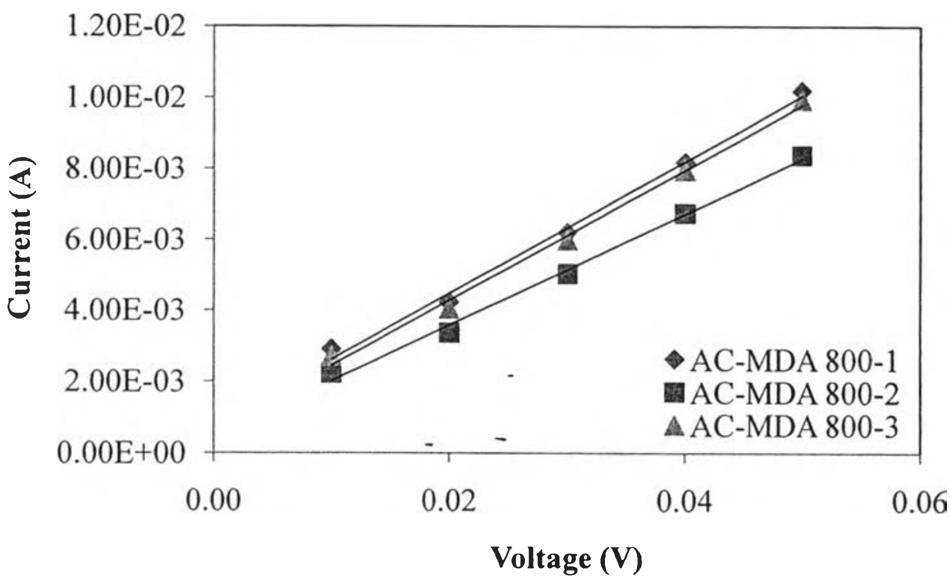

Figure A5 The slopes (1/resistance) of C-V plots of AC-MDA 800.

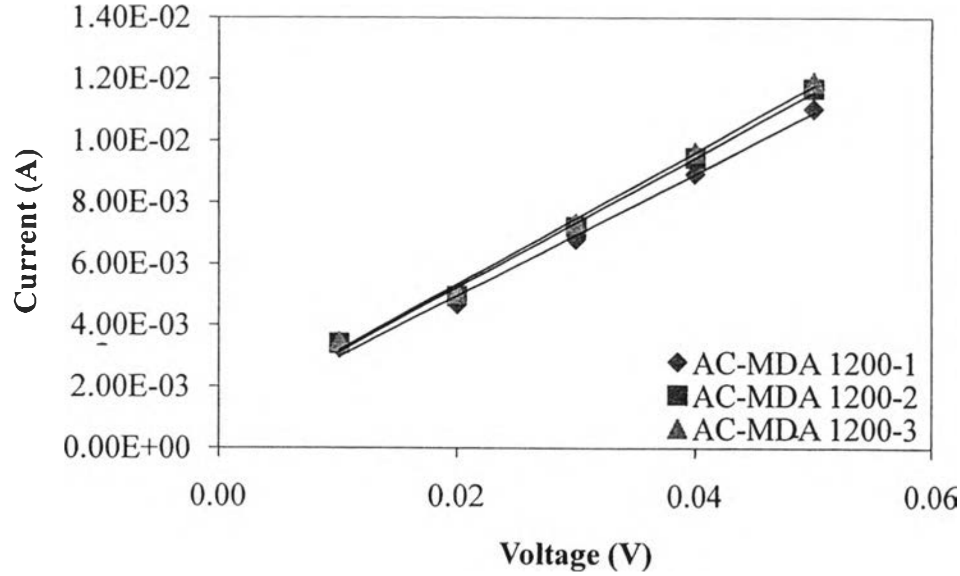

Figure A6 The slopes (1/resistance) of C-V plots of AC-MDA 1200.

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Presentations:

1. Watcharin,K., Thanyalak, C., and Sujitra, W. (2014, April)Modification of Polybenzoxazine-derived Nanocarbon by Heat Treatment.Paper presented at the 5th Research Symposium on Petrochemical and Materials Technology and the 20th PPC Symposium on Petroleum, Petrochemical and Polymers, Ballroom, Queen Sirikit National Convention Center, Bangkok, Thailand.
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