REFERENCES

Abalos, A., Pinazo, A., Infante, M. R., Casals, M., Garcia, F., Manresa. (2001) A. Physicochemical and antimicrobial properties of new rhamnolipids produced by *Pseudomonas aeruginosa* AT10 from soybean oil refinery wastes. Langmuir, *17*, 1367-1371.

Abraham, WR., Meye, H., Yakimov, M. (1998) Novel glycine containing glycolipids from the alkane using bacterium Alcanivorax borkumensis. Biochim Biophys Acta, 1393, 57-62.

Anikumar, P., and Jayakanan, M. (2007) Single-Molecular-System-Based Selective micellar Templates for Polyaniline nanomaterials: Control of Shape, Size, solid State Order, and Expanded Chain to Coillike Conformation. Macromolecules, 40 (20), 7311-7319.

Anikumar, P., and Jayakanan, M. (2008) Divergent Nanostructures from Identical Ingredients: Unique Amphiphilic Micelle Template for Polyaniline Nanofibers, Tubes, Rods, and Spheres. Macromolecules, 41(20), 7706-7715.

Anikumar, P., and Jayakanan, M. (2009) Self-Assembled Cylindrical and Vesicular molecular Templates for Polyaniline nanofibers and nanotapes. J.Phys. Chem. B, 113, 11614-11624.

Arino, S., Marchal, R., Vandecasteele. (1996) J.P., Applied and Environmental Microbiology, 45 162.

Banat, I. M., Makkar, R. S., Cameotra, S. S. (2000) Potential commercial applications of microbial surfactants. Appl Microbiol Biotechnol, 53, 495-508.

Benincasa, M., Abalos, M., Oliveira, I. (2004) Chemical structure, surface properties, and biological activities of the biosurfactant produced by *Pseudomonas aeruginosa* LBI from soapstock. Antonio van Leeuwenhoek, 85:1-8.

Bhadra, S., Khastgir, D., K. Singha, N., Lee, J. (2009) Pregress in preparation, processing and applications of polyaniline. Progress in Polymer Science.

Champion, J.T., Gilkey, J.C., Lamparski, H., Reitrer, J., Miller, R.M. (1995) Journal of colloid and Interface Science, 170, 569.

Chiou, N., J.Epstein, A. (2005) A simple Approach to control the Growth of Polyaniline Nanofibers. Synthetic Metals, 153, 69-72.

Ding, L., Wang, X., Gregory, R. (1999) Thermal properties of chemically synthesized polyaniline (EB) powder. Synthetic Metals, 104, 73-78.

Ding, X., Han, D., Wang, Z., Xu, X., Niu, L., Zhang, Q, (2008) Micelle0assisted synthesis of polyaniline/magnetite nanorods by in situ self-assembly process. Journal of Colloid and Interface Science, 320, 341-345.

Du, X., Zhou, C., Wang, G., Mai, Y. (2008) Novel Solid-State and Template-Free Synthesis of Branched Polyaniline Nanofibers. Chemistry of Materials, 20, 3806-3808.

Han, Y., Kusunose, T., Sekino, T., (2009) One-step reverse micelle polymerization of organic dispersible polyaniline nanoparticles. Synthetic Metals, 159, 123–131.

Hassan, P. A., Sawant S. N., Nitin, Bagkar, C., Yakhmi, J. V. (2004) Polyaniline Nanoparticles Prepared in Rodlike Micelles. American Chemical Societ, 20, 4874-4880.

Hassan, P., Sawant, S., Bagkar, N., Yakhmi, J. (2004) Polyaniline Nanoparticles Prepared in Rodlike Micelles. Langmiur, 20(12), 4874-4880.

Jeevananda, T., Lee, J., Siddaramaiah. (2008) Preparation of polyaniline nanostructures using sodium dodecylsulphate. Materials Letters, 62 , 3995–3998.

Kim, B., Oh, S., Han, M., Im, S. (2000) Preparation of Polyaniline Nanoparticles in Micellar Solutions as Polymerization Medium. American Chemical Society, 16, 5841-5845.

Kuramoto, N., Genies, E. (1995) Micellar chemical polymerization of aniline. Synthetic Metals, 68, 191-194.

Li, Dan., Huang, J., Kaner, R. (2008) Polyaniline nanofibers: A Unique Polymer Nanostructure for Versatile Applications. Accounts of chemical research, 42, 135-145.

Li, Dan., Kaner, R. (2006) Shape and Aggregation Control of Nanoparticles: Not shaken, Not Stirred. J.AM.CHEM.SOC, 128,968-975.

Moon, H., Park, J. (1998) Structure effect of polymeric acid dopants on the characteristics of doped polyaniline composites. Synthetic metals, 92, 223-228.

Nitschke, M., Costa, S., Contiero, J. (2005) Rhamnolipid Surfactant: An Update on the General Aspects of These Remarkable Biomolecules. Biotechnol, 21, 1593-1600.

Palanisamy, P., Raichur, A. M. (2009) Synthesis of spherical NiO nanoparticles through a novel biosurfactant mediated emulsion technique. Materials Science and Engineering C, 29, 199–204.

Park, S.Y., Cho, M.S., Choi, H.J. (2004) Synthesis and electrical characteristics of polyaniline nanoparticles and their polymeric composite. Current Applied Physics, 4, 581–583.

Pornsunthorntawee, O., Chavadej, S., Arttaweeporn, N., Paisanjit, S., Somboonthanate, P., Abe, M., Rujiravanit. R., (2008) Isolation and comparison of biosurfactants produced by Bacillus subtilisPT2 and Pseudomonas aeruginosa SP4 formicrobial surfactant-enhanced oil recovery. Biochemical Engineering Journal, 42, 172-179.

Pornsunthorntawee, O., Wongpani, P., Chavadej, S. (2008) Structural and physicochemical characterization of crude biosurfactant produced by *Pseudomonas aeruginosa* SP4 isolated from petroleum-contaminated soil. Bioresource Technology, 99, 1589-1595.

Rahy, A., Yang, D. (2008) Synthesis of highly conductive polyaniline nanofibers. Materials Letters, 62, 4311-4314.

Sadek, A., Wlodarski, W., Kalantar-Zadeh, K., Baker, C., Kaner, R.B. (2007) Doped and dedoped polyaniline nanofiber based conductomeric hydrogen gas sensors. Sensor and Actuators, 139,53-57.

Saravanan, C., Palaniappan, S., Chandezon, F.. (2008) Synthesis of nanoporous conducting polyaniline using ternary surfactant. Materials Letters, 62 , 882–885.

Seong, M., Park, S., Hwang, J., Choi, H. (2004) Synthesis and electrical properties of polymer composites with polyaniline nanoparticles. Materials Science and Engineering C, 24, 15-18.

Thanpicha, T., Sirivat, A., Jamieson, A. M., Rujiravanit, R. (2008) Synthesis of polyaniline nanofibrils using an in situ seeding technique. Synthetic Metals, 158, 695-703

Thanpitcha, T., Sirivat, A., Jamieson, A. M., Rujiravanit, R. (2008) Dendritic polyaniline nanoparticles synthesized by carboxymethyl chitin templating. European Polymer Journal, 44, 3423–3429.

Wang, Hongxia., Lin, Tong., Kaynak, Akif. (2005) Polypyrrole nanoparticles and dye absorption properties. Synthetic Metals, 151, 136–140.

Wei, Z., Zhang, Z., Wan, M. (2001) Formation Mechanism of Self-Assembled Polyaniline Micro/Nanotubes. American Chemical Society, 18, 917-921.

Yang, C., Chih, Y., Cheng, H., Chen, C. (2005) Nanofibers of self-doped polyaniline. Polymer, 46, 10688-10698.

Yu, L., Lee, J., Shin, K., Park, C., Holze, R. (2002) Preparation of Aqueous Polyaniline Dispersions by Micellar-Aided Polymerization. Journal of Applied Polymer Science, Vol. 88, 1550–1555.

Zhang, Donghua. (2007) On the conductivity measurement of polyaniline pellets. Polymer Testing, 26, 9-13.

Zhang, L., Peng, H., Sui, J., Kilmartin, P. A., Travas-Sejdic, J. (2008) Polyaniline nanotubes doped with polymeric acids. Current Applied Physics, 8 , 312–315.

Zhang, L., Wan, M. (2005) Chiral polyaniline nanotubes synthesized via a self-assembly process. Thin Solid Films, 477, 24-31.

APPENDICES

Appendix A Yielding of the Synthesized PANI

Table A1 Raw data of yield of PANI synthesized by conventional method

Conventional PANI	Order	Weight (g) ANI	Weight (g) PANI	% Yield	SD
ANI 2.55 g	1	2.553	0.682	26.71	
	2	2.553	0.650	25.46	
	3	2.553	0.662	25.93	
	Avg	**2.553**	**0.665**	**26.03**	**0.63**
ANI 2.04 g	1	2.043	0.601	29.42	
	2	2.043	0.597	29.22	
	3	2.043	0.610	29.86	
	Avg	**2.043**	**0.603**	**29.50**	**0.33**
ANI 1.74 g	1	1.736	0.547	31.51	
	2	1.736	0.517	29.78	
	3	1.736	0.523	30.13	
	Avg	**1.736**	**0.529**	**30.47**	**0.91**
ANI 1.02 g	1	1.021	0.338	33.10	
	2	1.021	0.347	33.99	
	3	1.021	0.371	36.34	
	Avg	**1.021**	**0.352**	**34.48**	**1.67**

Table A2 Raw data of yield of PANI synthesized using 1800 mg/L biosurfactant concentration as a template at 6 hr polymerization time

ANI : Biosurfactant weight ratio	Order	Weight (g) ANI	Weight (g) PANI	% Yield	SD
28.3 : 1	1	2.553	0.650	25.46	
	2	2.553	0.660	25.85	
	3	2.553	0.640	25.07	
	Avg	**2.553**	**0.650**	**25.46**	**0.39**
22.7 : 1	1	2.043	0.600	29.37	
	2	2.043	0.620	30.35	
	3	2.043	0.610	29.86	
	Avg	**2.043**	**0.610**	**29.86**	**0.49**
19.3 : 1	1	1.736	0.530	30.53	
	2	1.736	0.540	31.11	
	3	1.736	0.500	28.80	
	Avg	**1.736**	**0.523**	**30.15**	**1.20**
11.3 : 1	1	1.021	0.370	36.24	
	2	1.021	0.350	34.28	
	3	1.021	0.340	33.30	
	Avg	**1.021**	**0.353**	**34.61**	**1.50**

Table A3 Raw data of yield of PANI synthesized using 1800 mg/L biosurfactant concentration at different polymerization time

Polymerization time	Order	Weight (g) ANI	Weight (g) PANI	% Yield	SD
4 hr	1	2.043	0.550	26.92	
	2	2.043	0.520	25.45	
	3	2.043	0.510	24.96	
	Avg	**2.043**	**0.527**	**25.78**	**1.02**
6 hr	1	2.043	0.600	29.37	
	2	2.043	0.620	30.35	
	3	2.043	0.610	29.86	
	Avg	**2.043**	**0.610**	**29.86**	**0.49**
8 hr	1	2.043	0.800	39.16	
	2	2.043	0.750	36.71	
	3	2.043	0.690	33.77	
	Avg	**2.043**	**0.747**	**36.55**	**2.70**

Table A2 Raw data of yield of PANI synthesized using 3600 mg/L biosurfactant concentration as a template at 6 hr polymerization time

ANI : Biosurfactant	Order	Weight (g) ANI	Weight (g) PANI	% Yield	SD
14.2 : 1	1	2.553	0.610	23.89	
	2	2.553	0.600	23.50	
	3	2.553	0.620	24.29	
	Avg	**2.553**	**0.610**	**23.89**	**0.39**
11.4 : 1	1	2.043	0.580	28.39	
	2	2.043	0.600	29.37	
	3	2.043	0.610	29.86	
	Avg	**2.043**	**0.597**	**29.21**	**0.75**
9.6:1	1	1.736	0.510	29.38	
	2	1.736	0.500	28.80	
	3	1.736	0.500	28.80	
	Avg	**1.736**	**0.503**	**28.99**	**0.33**
5.6 : 1	1	1.021	0.340	33.30	
	2	1.021	0.350	34.28	
	3	1.021	0.330	32.32	
	Avg	**1.021**	**0.340**	**33.30**	**0.98**

Appendix B Determination of Ohmic Linear Regime

Linear regime or ohmic regime is the regime that applied voltage depends directly on the apply current according to ohmic law in equation (B1)

In this work, linear regime was determined by ploting applied voltage (V_a) versus current (I). The range that gives the straight line is acceptable for using in conductivity measurement. Figure A1 is the plot between V_a and I of the silicon wafer, as a standard material, using custom built two-point probe. This experiment was performed under 1 atm, 50% relative humidity, and 25°C.

$$\rho = {}^{V}/_{I} \quad = 1/\text{slope} \qquad \text{(B1)}$$

where V_0 = applied voltage (V)

I = current (A)

ρ = resistivity (Ω)

Probe number1

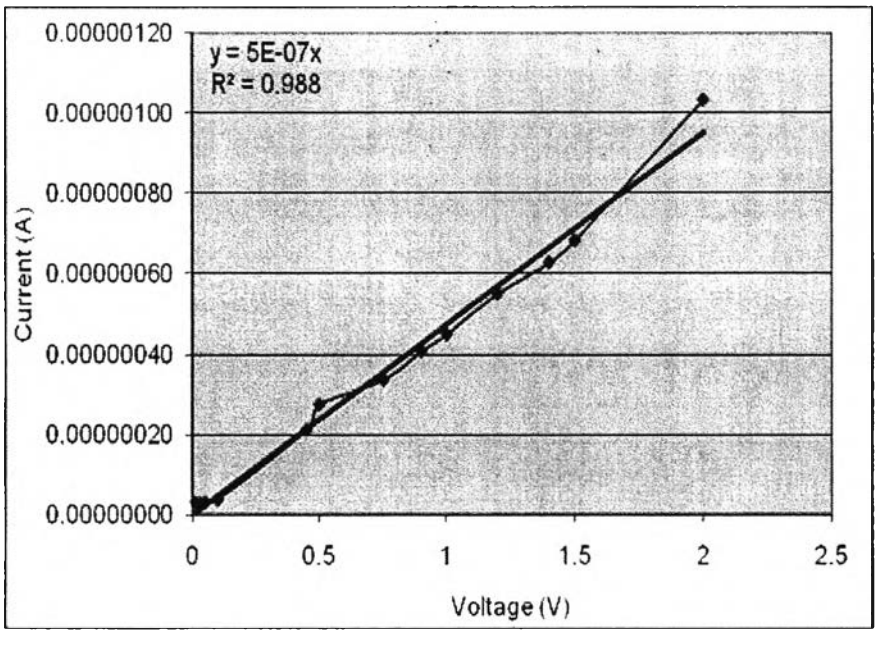


Figure B1 Linear regime of V_a and I of the silicon wafer, used as a standard material, obtained by the custom built two-point probe.

According to Figure A1, straight line is indicated the range of applied voltage and current corresponding to the ohmic law. The accepted range of those for using in conductivity measurement are 0.01 to 2 V.

Table B1 Raw data of determination of linear regime from silicon wafer by using custom built two-point probe

Applied voltage	Current (A)
2	1.03E-06
1.5	6.82E-07
1.4	6.27E-07
1.2	5.50E-07
1	4.50E-07
0.9	4.07E-07
0.75	3.36E-07
0.5	2.74E-07
0.45	2.11E-07
0.1	3.65E-08
0.05	2.98E-08
0.03	2.72E-08
0.01	2.94E-08

Probe number 2

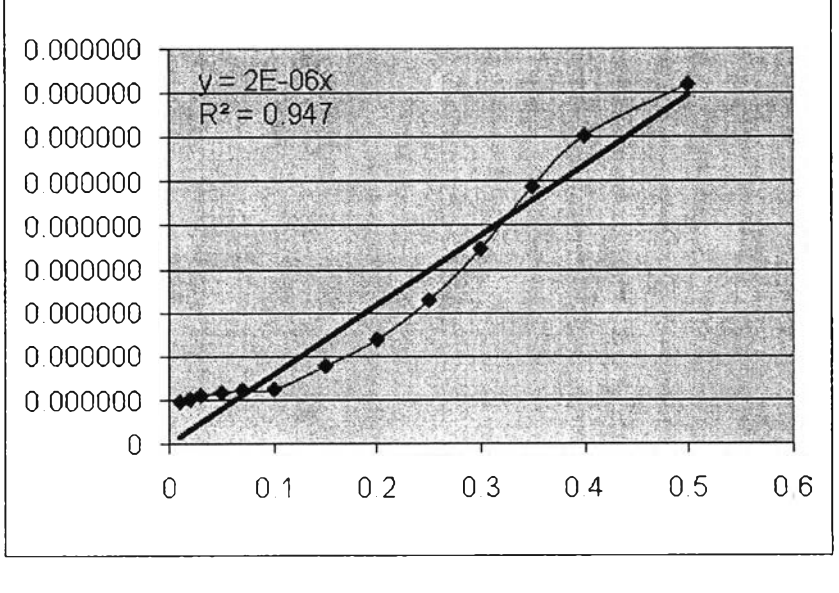


Figure B2 Linear regime of V_a and I of the silicon wafer, used as a standard material, obtained by the custom built two-point probe.

According to Figure B2, straight line is indicated the range of applied voltage and current corresponding to the ohmic law. The accepted range of those for using in conductivity measurement are 0.01 to 0.5 V.

Applied voltage	Current (A)
0.5	8.17E-07
0.4	7.02E-07
0.35	5.87E-07
0.3	4.47E-07
0.25	3.30E-07
0.2	2.40E-07
0.15	1.80E-07
0.1	1.27E-07
0.07	1.25E-07
0.05	1.19E-07
0.03	1.13E-07
0.02	1.04E-07
0.01	9.85E-08

Appendix C Determination of Geometric Correlation Factor (K) of Custom Built Two-Point Probe

Geometric correction factor (K) is a correction that takes into account of geometric effects. K factor can be determined by using the following equation (C1).

$$K = \frac{\rho_{ref}}{t \times v} \times I = \frac{slope \times \rho}{t} = \text{slope x } 107.373 \qquad \text{(C1)}$$

where K = geometric correction factor

ρ_{ref} = resistivity of standard material (Ω.cm)

t = sheet thickness (cm)

V = applied voltage (V)

I = current (A)

For conductive samples, such as polyaniline in the doped form, the silicon wafer with known resistivity/thickness of 107.373 Ω was used as a standard material for the determination of geometric correction factor (K).

Probe number 1

From Figure A1 slope = 5E-07 and $\frac{\rho}{t} = 107.373\,\Omega$

Therefore, the geometric correction factor (K) for the conductive samples of custom built two-point probe is **K = 5E-07 x 107.373 = 5.36E-05**

Probe number 2

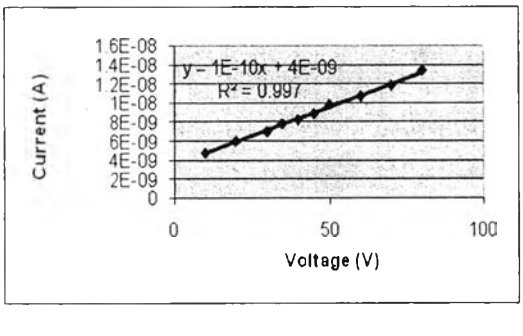
From Figure A2 slope = 2E-06 and $\frac{\rho}{t} = 107.373\,\Omega$

Therefore, the geometric correction factor (K) for the conductive samples of custom built two-point probe is **K = 2E-06 x 107.373 = 2.15E-04**

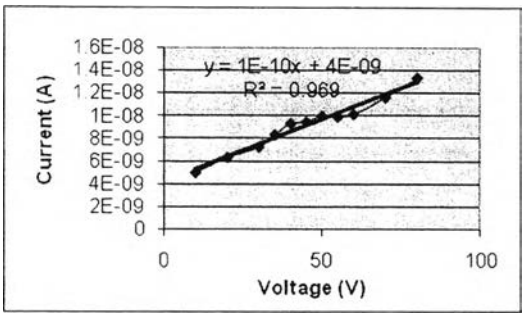
Appendix D Conductivity measurement

Table D1 Conductivity measurement of dedope polyaniline synthesized by using the ANI:Biosurfactant weight ratio of 11.3:1 at 6 hr polymerization time (Geometric correction factor is 5.36E-05)

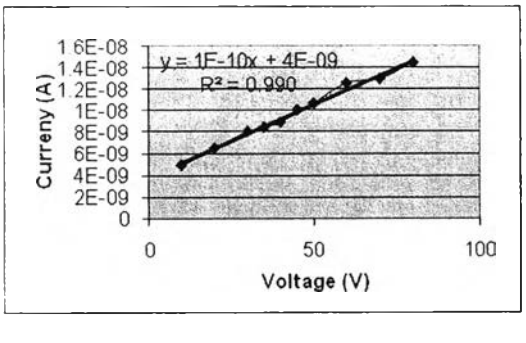
ANI:Surfactant	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
11.3 : 1	1	0.0029	80	1.34E-08	
		0.003	70	1.18E-08	
		0.0029	60	1.07E-08	
		0.0029	50	9.82E-09	
		0.003	45	8.89E-09	
		0.003	40	8.25E-09	
			35	7.84E-09	
			30	7.03E-09	
			20	6.01E-09	
			10	4.79E-09	
AVG		**0.0030**			**6.22E-04**



ANI:Surfactant	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
11.3 : 1	2	0.0029	80	1.34E-08	
		0.0031	70	1.16E-08	
		0.0031	60	1.01E-08	
		0.0032	55	9.89E-09	
		0.0032	50	9.98E-09	
		0.0031	45	9.45E-09	
			40	9.28E-09	
			35	8.29E-09	
			30	7.20E-09	
AVG		**0.0031**			**6.02E-04**



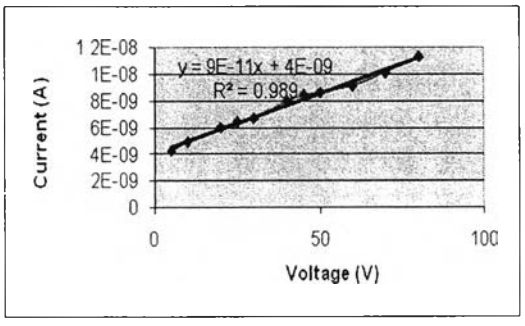
ANI:Surfactant	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
11.3 : 1	3	0.0031	80	1.45E-08	
		0.0032	70	1.30E-08	
		0.0032	60	1.26E-08	
		0.0031	50	1.07E-08	
		0.0031	45	1.01E-08	
		0.0032	40	8.93E-09	
		0.0029	35	8.46E-09	
		0.0031	30	8.06E-09	
			20	6.53E-09	
			10	4.95E-09	
AVG		**0.0031**			**6.02E-04**



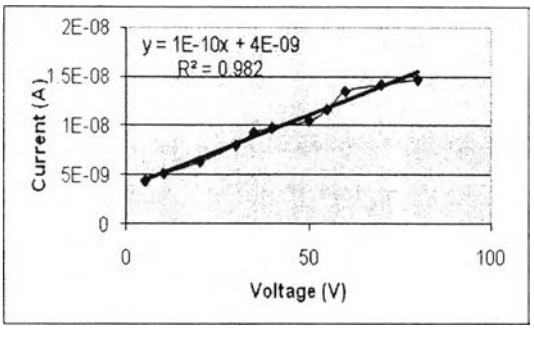
Sample	Specific Conductivities(S/cm)
1	6.22E-04
2	6.02E-04
3	6.02E-04
Average	**6.09E-04**
SD	**1.16E-05**

Table D2 Conductivity measurement of dedope polyaniline synthesized by using the ANI:Biosurfactant weight ratio of 19.3:1 at 6 hr polymerization time (Geometric correction factor is 5.36E-05)

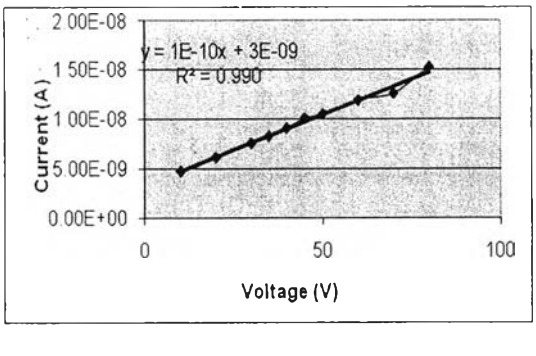
ANI:Surfactant	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
19.3 : 1	1	0.0031	80	1.13E-08	
		0.0029	70	1.01E-08	
		0.0037	60	9.12E-09	
		0.0035	50	8.61E-09	
		0.0034	45	8.40E-09	
		0.0035	40	7.95E-09	
			30	6.64E-09	
			25	6.37E-09	
			20	5.93E-09	
			10	4.85E-09	
			5	4.17E-09	
AVG		**0.0034**			**4.94E-04**



ANI:Surfactant	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
19.3 : 1	2	0.0032	60	1.35E-08	
		0.003	55	1.16E-08	
		0.0032	50	1.05E-08	
		0.0033	40	9.76E-09	
		0.0031	35	9.31E-09	
		0.003	30	8.03E-09	
			20	6.32E-09	
			10	5.12E-09	
			5	4.39E-09	
AVG		**0.0031**			**6.02E-04**



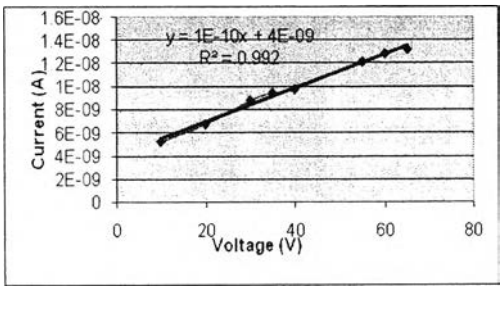
ANI:Surfactant	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
19.3 : 1	3	0.0034	80	1.53E-08	
		0.0032	70	1.26E-08	
		0.0039	60	1.19E-08	
		0.0027	50	1.05E-08	
		0.0031	45	1.01E-08	
		0.0033	40	9.09E-09	
		0.003	35	8.29E-09	
			30	7.56E-09	
			20	6.13E-09	
			10	4.76E-09	
AVG		**0.0032**			**5.83E-04**



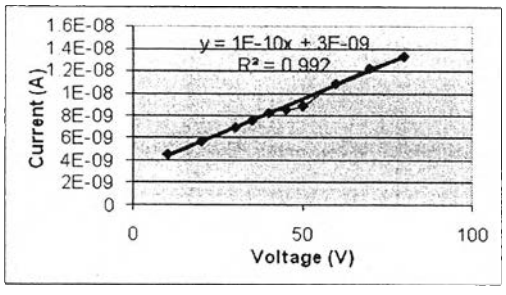
Sample	Specific Conductivities(S/cm)
1	4.94E-04
2	6.02E-04
3	5.83E-04
Average	**5.60E-04**
SD	**5.77E-05**

Table D3 Conductivity measurement of dedope polyaniline synthesized by using the ANI:Biosurfactant weight ratio of 22.7:1 at 6 hr polymerization time (Geometric correction factor is 5.36E-05)

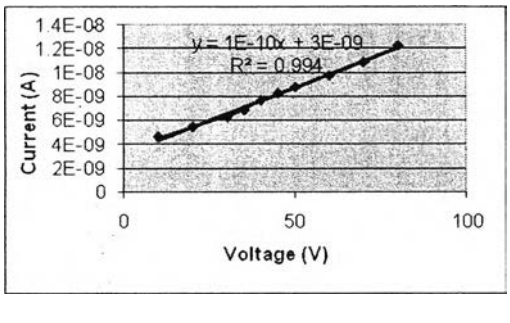
ANI:Surfactant	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
22.7 : 1	1	0.0034	65	1.33E-08	
		0.0031	60	1.29E-08	
		0.0039	55	1.22E-08	
		0.0042	50	1.28E-08	
		0.0033	45	1.17E-08	
		0.0045	40	9.59E-09	
			35	9.46E-09	
			30	8.79E-09	
			20	6.76E-09	
			10	5.24E-09	
AVG		**0.0037**			**5.04E-04**



ANI:Surfactant	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
22.7 : 1	2	0.0039	80	1.34E-08	
		0.0037	70	1.23E-08	
		0.0036	60	1.09E-08	
		0.00333	50	8.92E-09	
		0.0038	45	8.58E-09	
			40	8.29E-09	
			35	7.60E-09	
			30	6.98E-09	
			20	5.73E-09	
			10	4.58E-09	
AVG		**0.0037**			**5.04E-04**



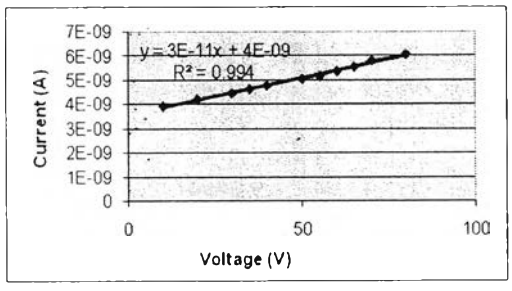
ANI:Surfactant	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
22.7 : 1	3	0.003	80	1.22E-08	
		0.0032	70	1.09E-08	
		0.0039	60	9.74E-09	
		0.0036	50	8.78E-09	
		0.0032	45	8.25E-09	
		0.0035	40	7.66E-09	
			35	6.85E-09	
			30	6.25E-09	
			20	5.43E-09	
			10	4.61E-09	
AVG		**0.0034**			**5.49E-04**



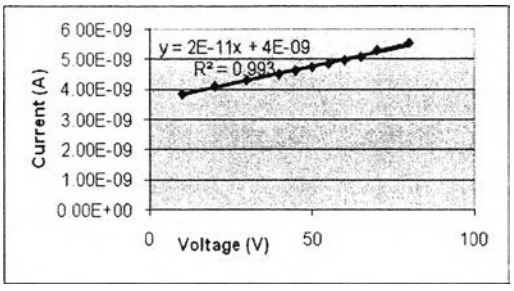
Sample	Specific Conductivities(S/cm)
1	5.04E-04
2	5.04E-04
3	5.49E-04
Average	**5.19E-04**
SD	**2.57E-05**

Table D4 Conductivity measurement of dedope polyaniline synthesized by using the ANI:Biosurfactant weight ratio of 28.3:1 at 6 hr polymerization time (Geometric correction factor is 5.36E-05)

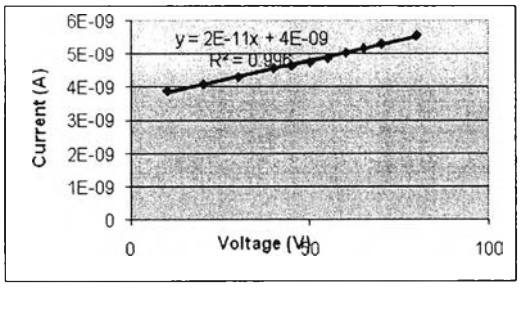
ANI:Surfactant	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
28.3 : 1	1	0.0045	80	6.04E-09	
		0.0045	70	5.78E-09	
		0.0044	65	5.52E-09	
		0.0047	60	5.35E-09	
		0.0046	55	5.14E-09	
			50	5.03E-09	
			40	4.75E-09	
			35	4.60E-09	
			30	4.43E-09	
			20	4.18E-09	
			10	3.91E-09	
AVG		**0.0045**			**1.24E-04**



ANI:Surfactant	order	thickness	voltage (v)	Current(A)	Conductivity(S/cm)
28.3 : 1	2	0.0037	80	5.5E-09	
		0.0036	70	5.3E-09	
		0.0035	65	5.1E-09	
		0.0032	60	5.0E-09	
		0.0031	55	4.9E-09	
		0.0032	50	4.7E-09	
		0.0037	45	4.6E-09	
			40	4.5E-09	
			30	4.3E-09	
			20	4.1E-09	
AVG		**0.0034**			**1.10E-04**



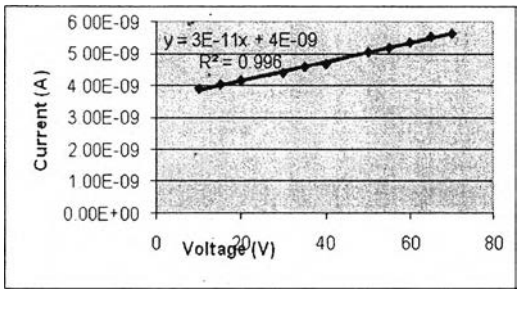
ANI:Surfactant	order	thickness	voltage (v)	Current(A)	Conductivity(S/cm)
28.3 : 1	3	0.0037	80	5.56E-09	
		0.0036	70	5.31E-09	
		0.0035	65	5.17E-09	
		0.0032	60	5.04E-09	
		0.0031	55	4.87E-09	
		0.0032	50	4.76E-09	
		0.0037	45	4.66E-09	
			40	4.57E-09	
			30	4.30E-09	
			20	4.09E-09	
			10	3.89E-09	
			10	3.91E-09	
AVG		**0.0034**			**1.10E-04**



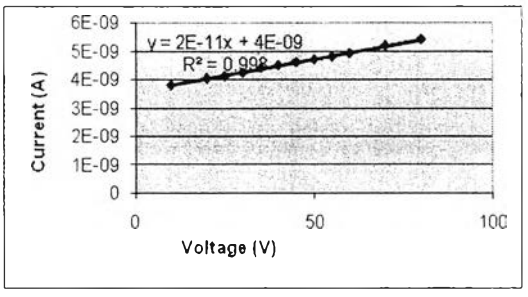
Sample	Specific Conductivities(S/cm)
1	1.24E-04
2	1.10E-04
3	1.10E-04
Average	**1.15E-04**
SD	**8.45E-06**

Table D5 Conductivity measurement of dedope polyaniline synthesized by conventional method using ANI 2.06 at 6 hr polymerization time (Geometric correction factor is 5.36E-05)

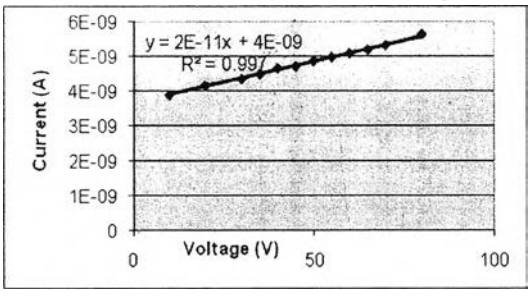
ANI	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
2.06 g	1	0.006	70	5.66E-09	
		0.0051	65	5.55E-09	
		0.0047	60	5.37E-09	
		0.0055	55	5.21E-09	
		0.0049	50	5.07E-09	
		0.0052	40	4.70E-09	
			35	4.61E-09	
			30	4.40E-09	
			20	4.18E-09	
			15	4.04E-09	
			10	3.91E-09	
			10	3.91E-09	
AVG		**0.0052**			**1.08E-04**



ANI	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
2.06 g	2	0.0055	80	5.41E-09	
		0.0055	70	5.19E-09	
		0.0058	60	4.91E-09	
		0.0047	55	4.79E-09	
		0.0046	50	4.70E-09	
			45	4.61E-09	
			40	4.49E-09	
			35	4.40E-09	
			30	4.23E-09	
			25	4.11E-09	
AVG		**0.0052**			**7.18E-05**



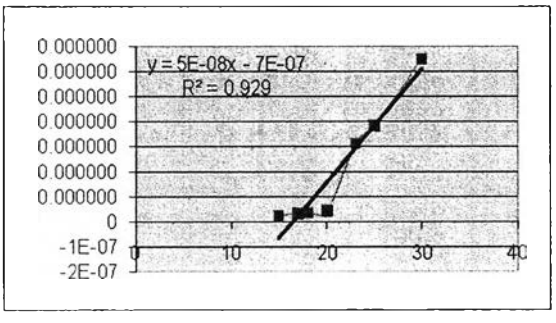
ANI	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
2.06 g	3	0.005	80	5.64E-09	
		0.0048	70	5.32E-09	
		0.0053	65	5.19E-09	
		0.0054	60	5.10E-09	
		0.0053	55	4.98E-09	
			50	4.87E-09	
			45	4.72E-09	
			40	4.66E-09	
			35	4.50E-09	
			30	4.36E-09	
			20	4.17E-09	
			10	3.90E-09	
AVG		**0.0052**			**7.18E-05**



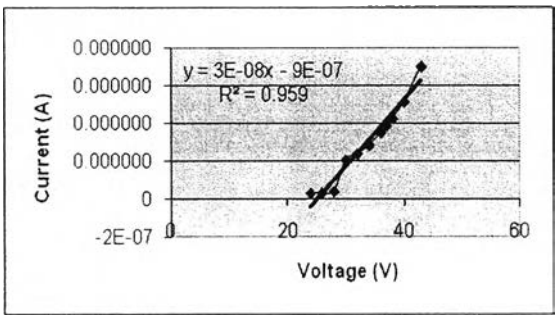
Sample	Specific Conductivities(S/cm)
1	1.08E-04
2	7.18E-05
3	7.18E-05
Average	**8.37E-05**
SD	**2.07E-05**

Table D6 Conductivity measurement of doped PANI synthesized with the ANI:Biosurfactant weight ratio of 22.7 : 1 at mole ratio between ANI : HCl equal to 1: 5 (Geometric factor is 2.15E-04)

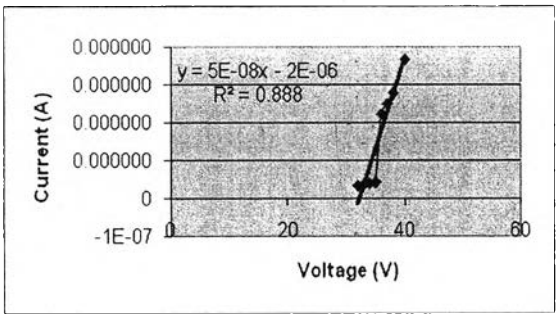
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/5	1	0.0065	30	6.48E-07	
		0.0064	25	3.81E-07	
		0.0066	23	3.10E-07	
		0.0066	20	4.28E-08	
		0.0066	18	3.53E-08	
			17	3.17E-08	
			15	2.58E-08	
			13	1.98E-08	
AVG		**0.00654**			**0.143**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/5	2	0.0075	43	6.99E-07	
		0.0078	40	5.12E-07	
		0.0078	38	4.25E-07	
		0.0077	37	3.86E-07	
		0.0074	36	3.49E-07	
			34	2.82E-07	
			32	2.37E-07	
			30	2.03E-07	
			28	3.76E-08	
			26	3.26E-08	
			24	2.81E-08	
AVG		**0.00764**			**0.073**



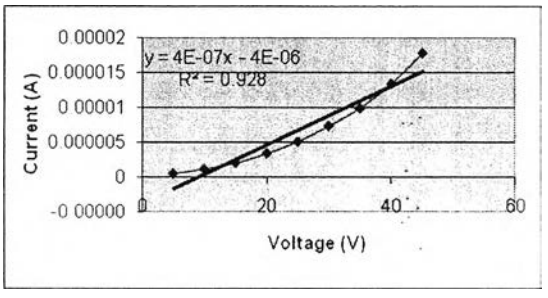
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/5	3	0.008	40	3.65E-07	
		0.0082	38	2.77E-07	
		0.0083	37	2.48E-07	
		0.008	36	2.21E-07	
		0.0082	35	4.13E-08	
			34	3.85E-08	
			33	3.52E-08	
			32	3.26E-08	
			30	2.83E-08	
			28	2.46E-08	
AVG		**0.00814**			**0.115**



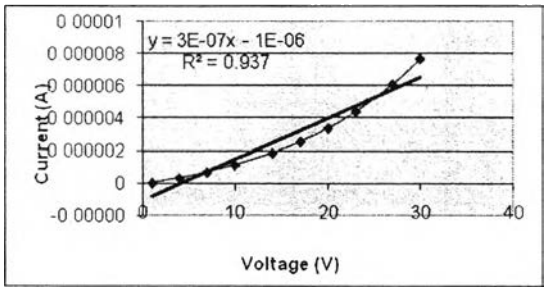
Sample	Specific Conductivities(S/cm)
1	0.143
2	0.073
3	0.115
Average	**0.110**
SD	**0.0349**

Table D7 Conductivity measurement of doped PANI synthesized with ANI:Biosurfactant weight ratio of 22.7:1 at mole ratio between ANI:HCl equal to 1/25 (Geometric correction factor is 5.36E-05)

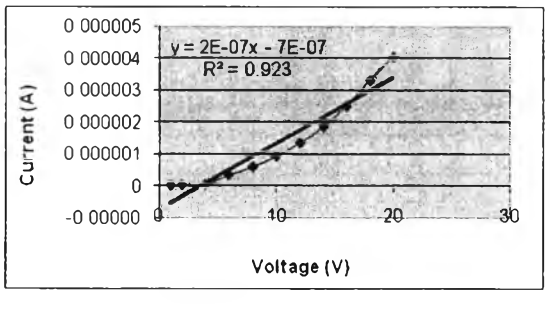
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/25	1	0.0039	45	1.78E-05	
		0.0041	40	1.33E-05	
		0.0040	35	9.84E-06	
		0.0042	30	7.31E-06	
		0.0042	25	5.01E-06	
			20	3.32E-06	
			15	1.96E-06	
			10	1.07E-06	
			5	4.39E-07	
AVG		**0.0041**			**1.829**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/25	2	0.0038	30	7.68E-06	
		0.0031	27	6.11E-06	
		0.0036	23	4.41E-06	
		0.0035	20	3.39E-06	
		0.0037	17	2.56E-06	
			14	1.85E-06	
			10	1.12E-06	
			7	6.78E-07	
			4	3.23E-07	
			1	1.95E-08	
AVG		**0.0035**			**1.581**



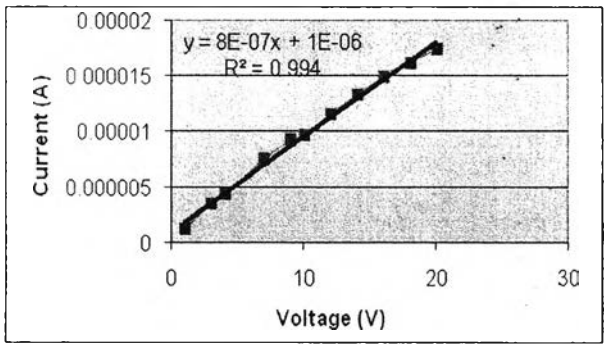
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/25	3	0.0029	20	4.03E-06	
		0.0029	18	3.29E-06	
		0.0031	16	2.49E-06	
		0.0029	14	1.84E-06	
		0.0030	12	1.34E-06	
			10	9.23E-07	
			8	5.86E-07	
			6	3.38E-07	
			4	4.33E-08	
			2	2.21E-08	
			1	1.29E-08	
AVG		**0.0030**			**1.261**



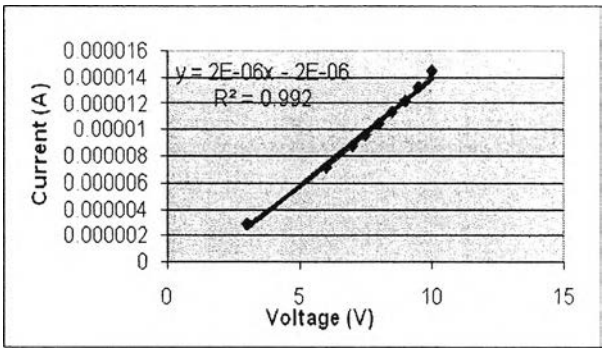
Sample	Specific Conductivities(S/cm)
1	1.829
2	1.581
3	1.261
Average	**1.557**
SD	**0.285**

Table D8 Conductivity measurement of doped PANI synthesized with ANI:Biosurfactant weight ratio of 22.7:1 at mole ratio between ANI:HCl equal to 1/50 (Geometric correction factor is 5.36E-05)

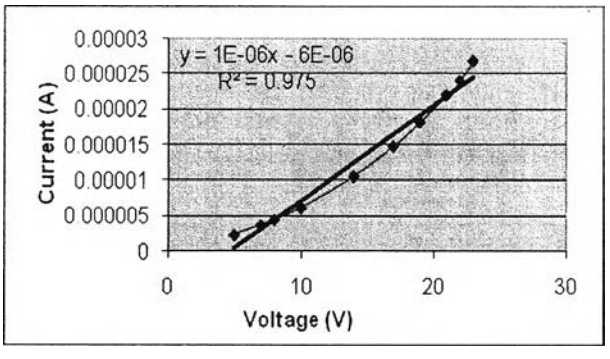
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/50	1	0.0072	80	7.26E-09	
		0.0071	70	6.85E-09	
		0.0060	60	6.28E-09	
		0.0057	55	5.94E-09	
		0.0070	50	5.77E-09	
		0.0070	45	5.56E-09	
			40	5.35E-09	
			30	4.92E-09	
			20	4.45E-09	
			15	4.22E-09	
			10	4.00E-09	
AVG		**0.0067**			**2.228**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/50	2	0.0049	10	1.44E-05	
		0.0086	9.5	1.32E-05	
		0.0089	9	1.21E-05	
		0.0047	8.5	1.13E-05	
		0.0090	8	1.04E-05	
			7.5	9.55E-06	
			7	8.73E-06	
			6	7.11E-06	
			3	2.90E-06	
AVG		**0.0072**			**5.168**



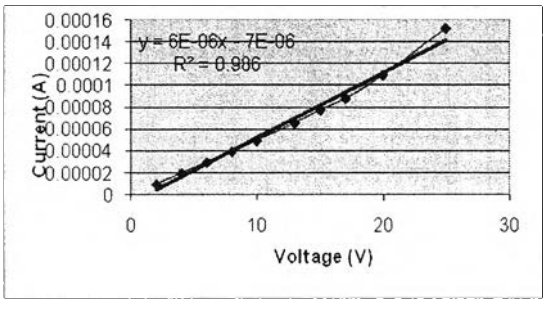
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/50	3	0.0043	23	2.68E-05	
		0.0055	22	2.40E-05	
		0.0054	21	2.20E-05	
		0.0047	19	1.82E-05	
		0.0053	17	1.48E-05	
			14	1.06E-05	
			10	6.15E-06	
			8	4.44E-06	
			7	3.71E-06	
			5	2.30E-06	
AVG		**0.00504**			**3.702**



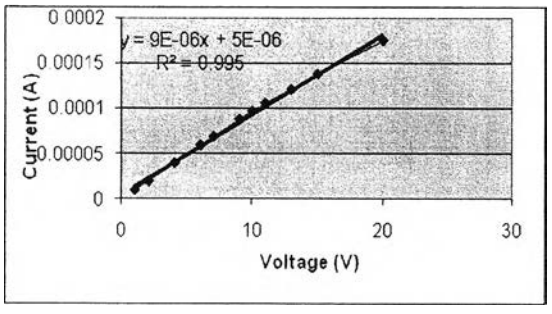
Sample	Specific Conductivities(S/cm)
1	2.228
2	5.168
3	3.702
Average	**3.699**
SD	**1.470**

Table D9 Conductivity measurement of doped PANI synthesized with ANI:Biosurfactant weight ratio of 22.7:1 at mole ratio between ANI:HCl equal to 1/100 (Geometric correction factor is 5.36E-05)

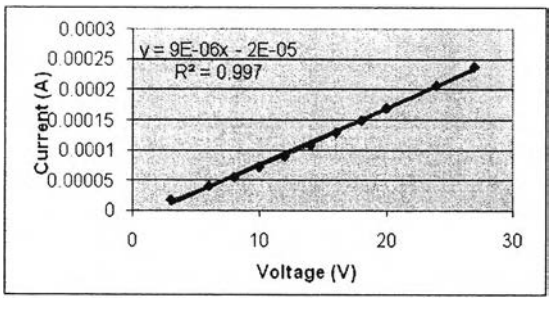
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	1	0.0046	25	1.52E-04	
		0.0044	20	1.10E-04	
		0.0044	17	8.80E-05	
		0.004	15	7.76E-05	
		0.0042	13	6.55E-05	
			10	4.94E-05	
			8	3.94E-05	
			6	2.97E-05	
			4	1.97E-05	
			2	9.70E-06	
AVG		**0.00432**			**25.912**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	2	0.0057	20	1.75E-04	
		0.0058	15	1.38E-04	
		0.0099	13	1.21E-04	
		0.0096	11	1.06E-04	
		0.0057	10	9.69E-05	
			9	8.79E-05	
			7	6.85E-05	
			6	5.92E-05	
			4	3.94E-05	
			2	1.95E-05	
AVG		**0.00734**			**22.876**



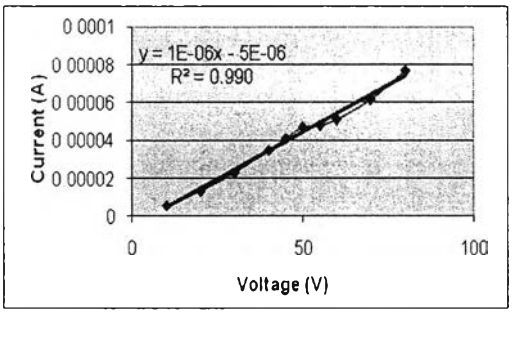
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	3	0.0061	27	2.39E-03	
		0.0067	24	2.08E-03	
		0.0070	20	1.71E-03	
		0.0061	18	1.50E-03	
		0.0068	16	1.30E-03	
		0.0065	14	1.09E-03	
			12	9.06E-04	
			10	7.30E-04	
			8	5.61E-04	
			6	4.11E-04	
			3	1.80E-04	
AVG		**0.0065**			**25.714**



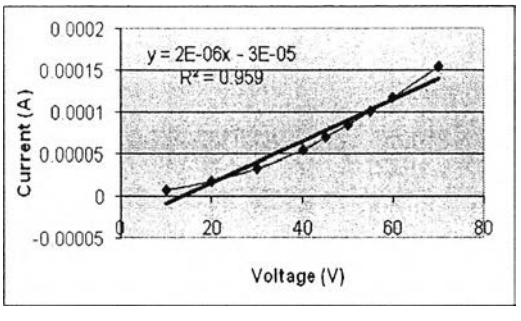
Sample	Specific Conductivities(S/cm)
1	25.912
2	22.876
3	25.714
Average	**24.834**
SD	**1.698**

Table D10 Conductivity measurement of doped PANI synthesized with ANI:Biosurfactant weight ratio of 22.7:1 at mole ratio between ANI:HCl equal to 1/200 (Geometric correction factor is 5.36E-05)

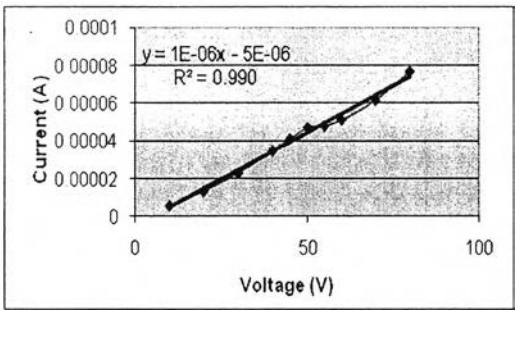
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/200	1	0.0067	80	7.70E-05	
		0.0062	70	6.17E-05	
		0.0062	60	5.13E-05	
		0.0076	55	4.81E-05	
		0.0074	50	4.72E-05	
			45	4.12E-05	
			40	3.49E-05	
			30	2.31E-05	
			20	1.34E-05	
			10	5.78E-06	
AVG		**0.00682**			**2.744**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/200	2	0.0057	70	1.55E-04	
		0.0059	60	1.18E-04	
		0.0064	55	1.01E-04	
		0.0068	50	8.52E-05	
		0.0054	45	7.04E-05	
			40	5.51E-05	
			30	3.31E-05	
			20	1.81E-05	
			10	7.65E-06	
AVG		**0.00604**			**6.219**



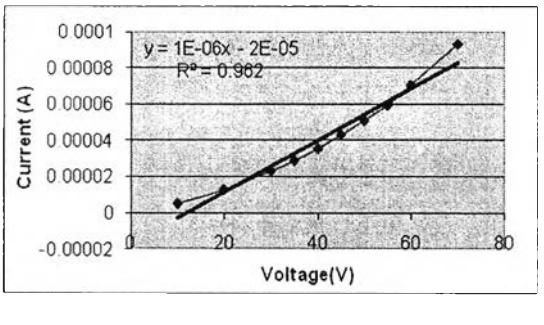
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/200	3	0.0041	80	7.70E-05	
		0.0048	70	6.17E-05	
		0.0047	60	5.13E-05	
		0.0045	55	4.81E-05	
		0.0048	50	4.72E-05	
			45	4.12E-05	
			40	3.49E-05	
			30	2.31E-05	
			20	1.34E-05	
			10	5.78E-06	
AVG		**0.00458**			**4.056**



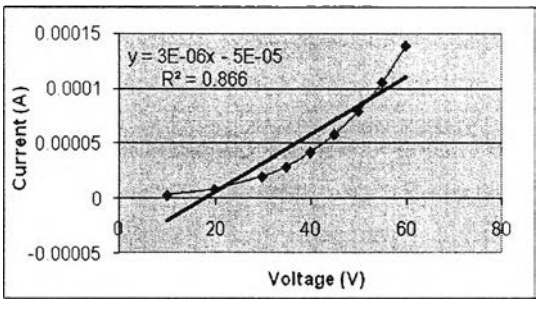
Sample	Specific Conductivities(S/cm)
1	2.744
2	6.219
3	4.056
Average	**4.339**
SD	**1.755**

Table D11 Conductivity measurement of doped PANI synthesized with ANI:Biosurfactant weight ratio of 22.7:1 at mole ratio between ANI:HCl equal to 1/300 (Geometric correction factor is 5.36E-05)

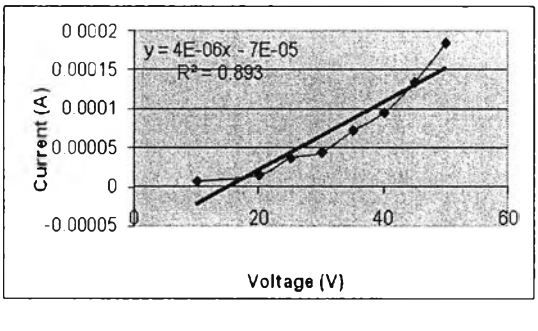
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/300	1	0.0054	70	9.30E-05	
		0.0059	60	7.03E-05	
		0.0065	55	5.92E-05	
		0.0066	50	5.09E-05	
		0.006	45	4.30E-05	
			40	3.55E-05	
			35	2.88E-05	
			30	2.31E-05	
			20	1.29E-05	
			10	5.16E-06	
AVG		**0.00608**			**3.058**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/300	2	0.0089	60	1.38E-04	
		0.0093	55	1.06E-04	
		0.009	50	7.92E-05	
		0.0086	45	5.80E-05	
		0.0095	40	4.18E-05	
			35	2.91E-05	
			30	2.02E-05	
			20	8.84E-06	
			10	3.17E-06	
AVG		**0.00906**			**6.219**



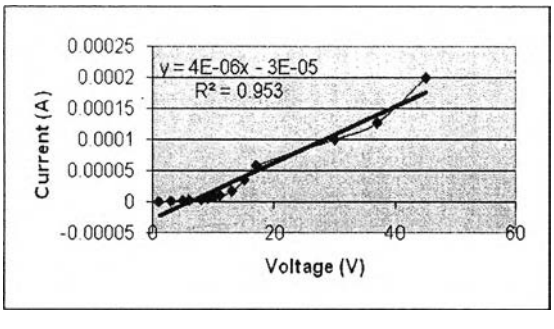
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/300	3	0.0085	50	1.84E-04	
		0.0093	45	1.34E-04	
		0.0092	40	9.45E-05	
		0.0082	35	7.16E-05	
		0.0092	30	4.43E-05	
			25	3.67E-05	
			20	1.50E-05	
			10	6.84E-06	
AVG		**0.00888**			**8.385**



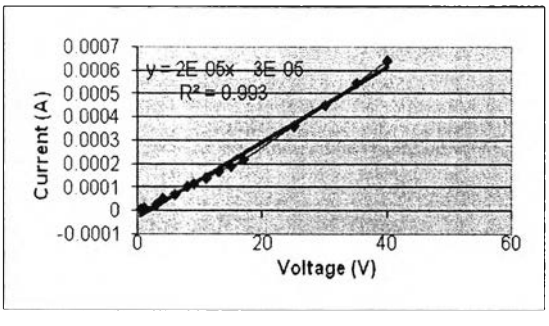
Sample	Specific Conductivities(S/cm)
1	3.058
2	6.219
3	8.385
Average	**5.887**
SD	**2.679**

Table D12 Conductivity measurement of doped PANI synthesized with ANI:Biosurfactant weight ratio of 28.3:1 at mole ratio between ANI:HCl equal to 1/100 (Geometric correction factor is 2.15E-04)

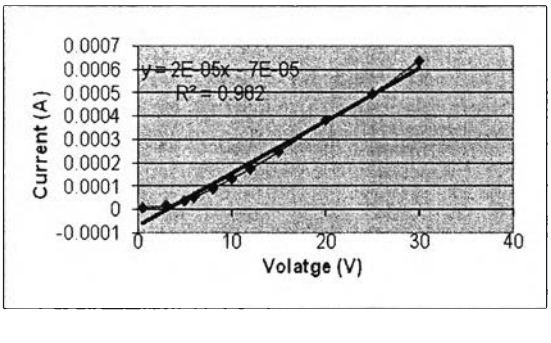
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	1	0.0064	45	1.99E-04	
		0.0052	37	1.26E-04	
		0.0064	30	1.00E-04	
		0.0065	17	5.80E-05	
		0.0064	15	3.52E-05	
			13	1.74E-05	
			11	1.02E-05	
			10	7.65E-06	
			9	5.84E-06	
			8	4.50E-06	
			6	2.82E-06	
			5	2.07E-06	
AVG		**0.0062**			**3.025**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	2	0.0116	40	6.42E-04	
		0.0108	35	5.44E-04	
		0.0105	30	4.50E-04	
		0.0112	25	3.61E-04	
		0.0104	17	2.16E-04	
			15	1.87E-04	
			13	1.67E-04	
			11	1.38E-04	
			9	1.14E-04	
AVG		**0.0109**			**8.574**



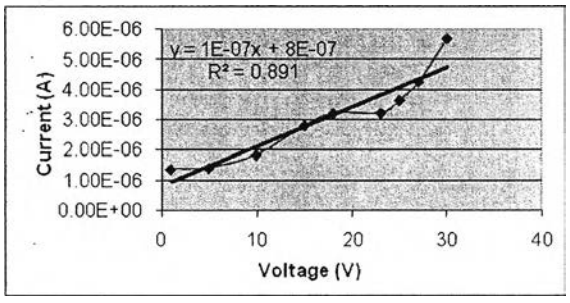
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	3	0.0096	30	6.36E-04	
		0.0092	25	4.95E-04	
		0.0112	20	3.83E-04	
		0.016	15	2.46E-04	
		0.0114	12	1.74E-04	
			10	1.31E-04	
			8	8.82E-05	
			6	5.11E-05	
			5	3.60E-05	
			3	1.57E-05	
			0.5	5.07E-06	
AVG		**0.0115**			**8.141**



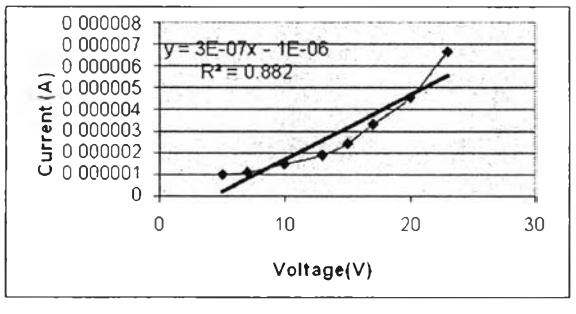
Sample	Specific Conductivities(S/cm)
1	3.025
2	8.574
3	8.141
Average	**6.580**
SD	**3.087**

Table D13 Conductivity measurement of doped PANI synthesized with ANI:Biosurfactant weight ratio of 19.3:1 at mole ratio between ANI:HCl equal to 1/100 (Geometric correction factor is 2.15E-04)

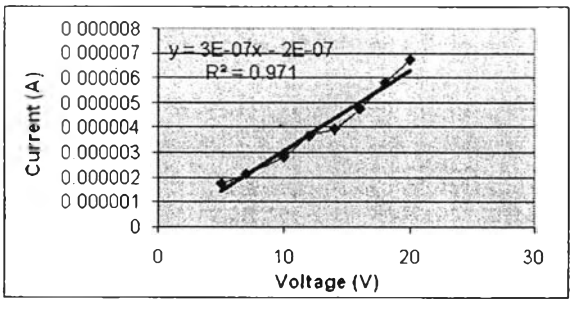
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	1	0.0036	30	5.69E-06	
		0.0039	27	4.26E-06	
		0.004	25	3.64E-06	
		0.0035	23	3.22E-06	
		0.0045	18	3.2E-06	
			15	2.8E-06	
			10	1.83E-06	
			5	1.39E-06	
			1	1.35E-06	
AVG		**0.0039**			**0.119**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	2	0.0088	23	6.68E-06	
		0.0088	20	4.55E-06	
		0.01	17	3.34E-06	
		0.0089	15	2.44E-06	
		0.009	13	1.9E-06	
			10	1.47E-06	
			7	1.09E-06	
			5	9.86E-07	
AVG		**0.0091**			**0.153**



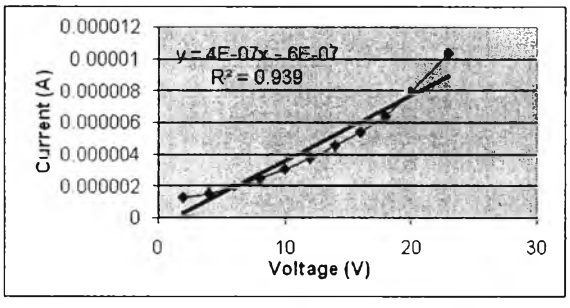
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	3	0.0100	20	6.76E-06	
		0.0104	18	5.83E-06	
		0.0144	16	4.77E-06	
		0.0086	14	3.97E-06	
		0.0010	12	3.7E-06	
			10	2.87E-06	
			7	2.18E-06	
			5	1.79E-06	
AVG		**0.0089**			**0.157**



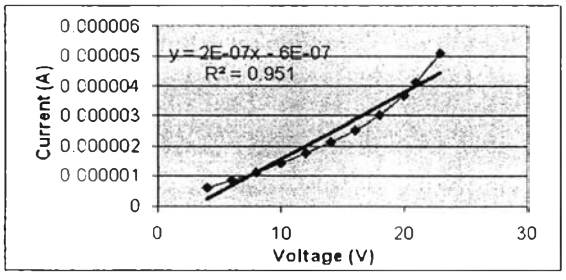
Sample	Specific Conductivities(S/cm)
1	0.119
2	0.153
3	0.157
Average	**0.143**
SD	**0.021**

Table D14 Conductivity measurement of doped PANI synthesized with ANI:Biosurfactant weight ratio of 11.3:1 at mole ratio between ANI:HCl equal to 1/100 (Geometric correction factor is 2.15E-04)

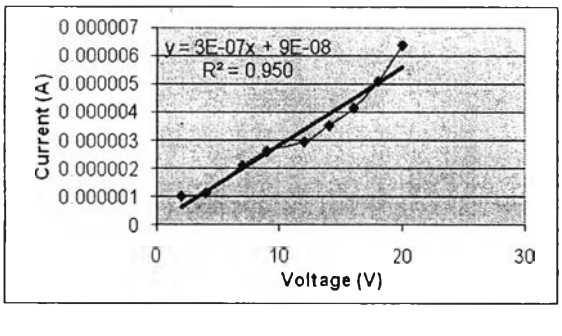
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	1	0.0106	23	1.03E-05	
		0.0130	20	7.89E-06	
		0.0120	18	6.38E-06	
		0.0120	16	5.38E-06	
		0.0130	14	4.52E-06	
			12	3.73E-06	
			10	3.03E-06	
			8	2.45E-06	
			6	1.94E-06	
			4	1.47E-06	
			2	1.25E-06	
AVG		**0.0121**			**0.154**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	2	0.0082	20	3.7E-06	
		0.0079	18	3.06E-06	
		0.008	16	2.56E-06	
		0.0079	14	2.17E-06	
		0.0076	12	1.8E-06	
			10	1.46E-06	
			8	1.15E-06	
			6	8.88E-07	
			4	6.4E-07	
AVG		**0.0079**			**0.118**



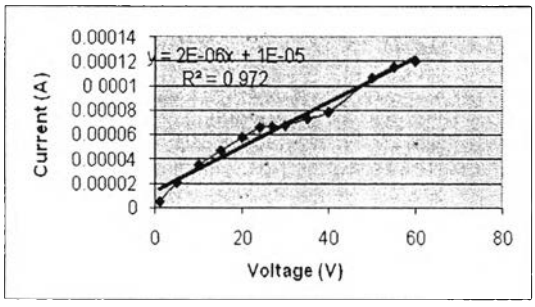
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	3	0.0092	20	6.37E-06	
		0.0087	18	5.1E-06	
		0.012	16	4.15E-06	
		0.0091	14	3.53E-06	
		0.0092	12	2.96E-06	
			9	2.61E-06	
			7	2.11E-06	
			4	1.15E-06	
			2	1.03E-06	
AVG		**0.0096**			**0.145**



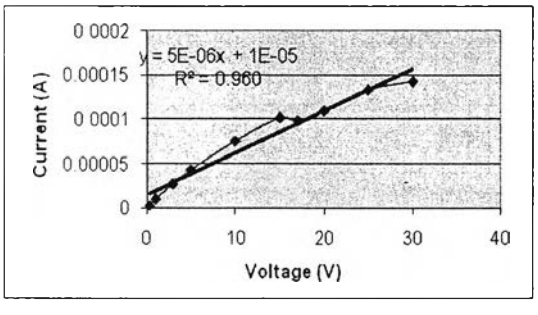
Sample	Specific Conductivities(S/cm)
1	0.154
2	0.118
3	0.145
Average	**0.139**
SD	**0.019**

Table D15 Conductivity measurement of doped PANI synthesized by conventional method at mole ratio between ANI:HCl equal to 1/5 (Geometric correction factor is 2.15E-04)

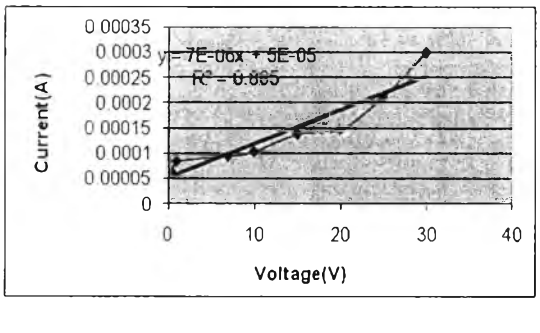
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/5	1	0.0090	60	1.20E-04	
		0.0095	55	1.15E-04	
		0.0095	50	1.06E-04	
		0.0093	40	7.85E-05	
		0.0090	35	7.31E-05	
			30	6.72E-05	
			27	6.65E-05	
			24	6.57E-05	
			20	5.75E-05	
			15	4.66E-05	
			10	3.48E-05	
AVG		**0.00926**			**1.009**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/5	2	0.0083	30	1.43E-04	
		0.0081	25	1.33E-04	
		0.0078	20	1.10E-04	
		0.0081	17	9.84E-05	
		0.008	15	1.02E-04	
			10	7.54E-05	
			5	4.31E-05	
			3	2.75E-05	
			1	1.03E-05	
			0.3	2.98E-06	
AVG		**0.00806**			**2.899**



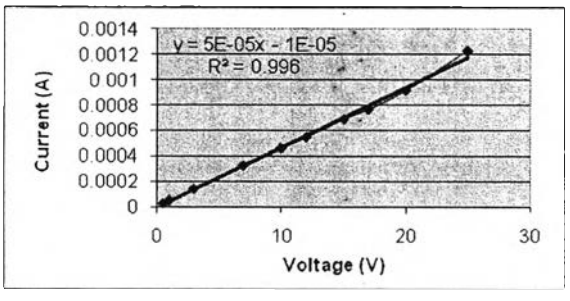
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/5	3	0.0089	30	2.99E-04	
		0.0093	25	2.11E-04	
		0.0096	20	1.46E-04	
		0.0097	15	1.38E-04	
		0.0098	10	1.03E-04	
			7	9.38E-05	
			1	8.35E-05	
			0.5	6.21E-05	
AVG		**0.00946**			**3.458**



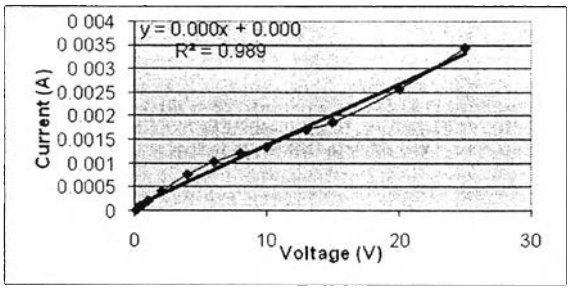
Sample	Specific Conductivities(S/cm)
1	1.009
2	2.899
3	3.458
Average	**2.455**
SD	**1.283**

Table D16 Conductivity measurement of doped PANI synthesized by conventional method at mole ratio between ANI:HCl equal to 1/25 (Geometric correction factor is 2.15E-04)

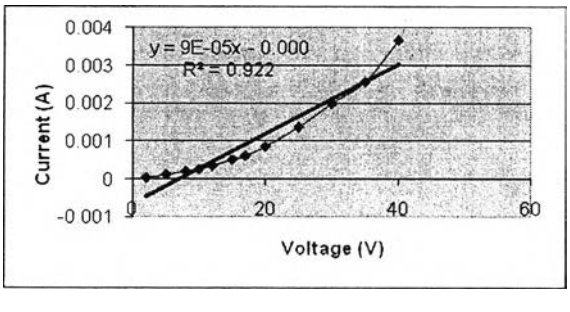
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/25	1	0.010	25	1.23E-03	
		0.014	20	9.17E-04	
		0.010	17	7.66E-04	
		0.014	15	6.89E-04	
		0.010	12	5.47E-04	
			10	4.62E-04	
			7	3.23E-04	
			3	1.40E-04	
			1	4.76E-05	
			0.5	2.43E-05	
AVG		**0.0114**			**20.531**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/25	2	0.009	25	3.44E-03	
		0.010	20	2.57E-03	
		0.014	15	1.87E-03	
		0.009	13	1.72E-03	
		0.011	10	1.36E-03	
			8	1.22E-03	
			6	1.04E-03	
			4	7.75E-04	
			2	4.16E-04	
			1	2.17E-04	
			0.5	1.11E-04	
AVG		**0.0106**			**43.918**



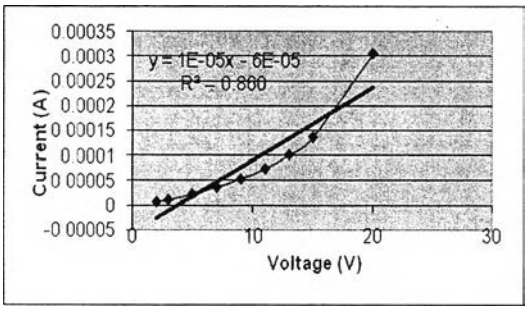
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/25	3	0.0093	25	3.44E-03	
		0.0089	20	2.57E-03	
		0.009	15	1.87E-03	
		0.0085	13	1.72E-03	
		0.0086	10	1.36E-03	
			8	1.22E-03	
			6	1.04E-03	
			4	7.75E-04	
			2	4.16E-04	
			1	2.17E-04	
			0.5	1.11E-04	
			0.2	4.43E-05	
			0.08	1.78E-05	
AVG		**0.0089**			**47.47**



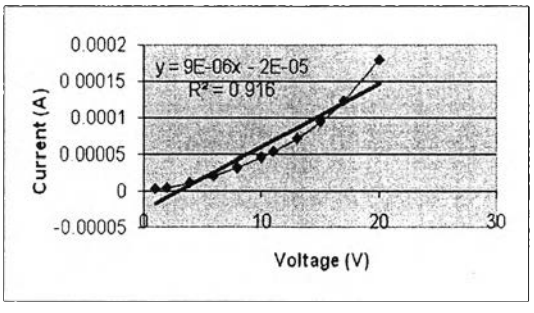
Sample	Specific Conductivities(S/cm)
1	20.531
2	43.918
3	47.467
Average	**37.306**
SD	**14.635**

Table D17 Conductivity measurement of doped PANI synthesized by conventional method at mole ratio between ANI:HCl equal to 1/50 (Geometric correction factor is 2.15E-04)

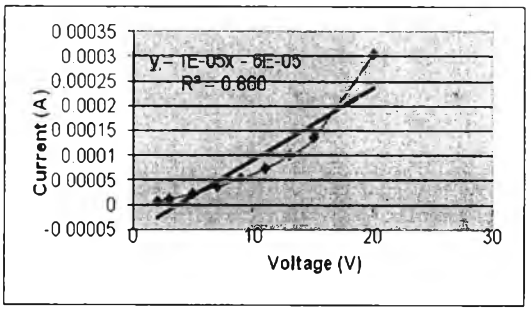
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A	Conductivity(S/cm)
1/50	1	0.0104	20	3.04E-04	
		0.0101	15	1.36E-04	
		0.0103	13	1.01E-04	
		0.0090	11	7.37E-05	
		0.0090	9	5.32E-05	
			7	3.69E-05	
			5	2.31E-05	
			3	1.15E-05	
			2	7.19E-06	
AVG		**0.0098**			**4.768**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A	Conductivity(S/cm)
1/50	2	0.0065	20	1.80E-04	
		0.0064	17	1.24E-04	
		0.0060	15	9.47E-05	
		0.0060	13	7.18E-05	
		0.0061	11	5.40E-05	
			10	4.65E-05	
			8	3.26E-05	
			6	2.11E-05	
			4	1.19E-05	
			2	4.75E-06	
			1	3.39E-06	
AVG		**0.0062**			**6.783**



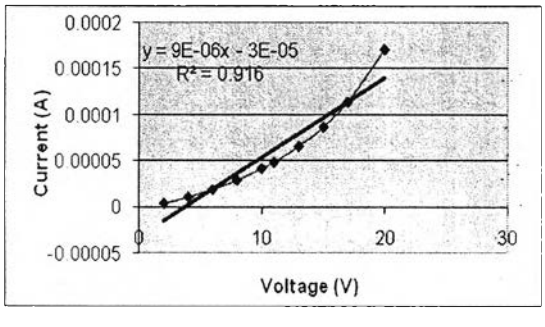
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A	Conductivity(S/cm)
1/50	3	0.0087	20	3.04E-04	
		0.0083	15	1.36E-04	
		0.0089	13	1.01E-04	
		0.0087	11	7.37E-05	
		0.0088	9	5.32E-05	
			7	3.69E-05	
			5	2.31E-05	
			3	1.15E-05	
			2	7.19E-06	
AVG		**0.0087**			**5.371**



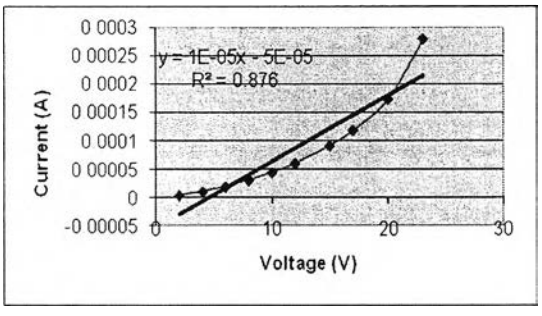
Sample	Specific Conductivities(S/cm)
1	4.768
2	6.783
3	5.371
Average	**5.641**
SD	**1.034**

Table D18 Conductivity measurement of doped PANI synthesized by conventional method at mole ratio between ANI:HCl equal to 1/100 (Geometric correction factor is 2.15E-04)

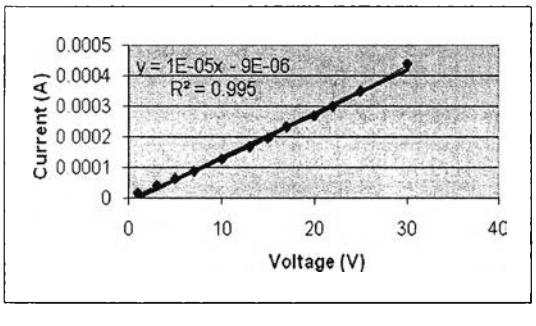
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	1	0.0082	20	1.71E-04	
		0.0082	17	1.14E-04	
		0.0083	15	8.70E-05	
		0.0081	13	6.60E-05	
		0.0082	11	4.92E-05	
			10	4.20E-05	
			8	2.94E-05	
			6	1.93E-05	
			4	1.08E-05	
			2	4.20E-06	
AVG		**0.0082**			**5.129**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	2	0.0083	23	2.79E-04	
		0.0081	20	1.73E-04	
		0.0077	17	1.18E-04	
		0.0082	15	9.07E-05	
		0.0080	12	6.03E-05	
			10	4.40E-05	
			8	3.05E-05	
			6	1.94E-05	
			4	1.06E-05	
			2	3.98E-06	
AVG		**0.0081**			**5.798**



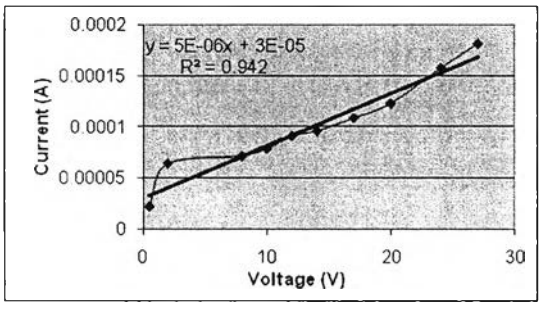
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	3	0.0104	30	4.36E-04	
		0.0102	25	3.48E-04	
		0.0102	22	2.98E-04	
		0.0102	20	2.68E-04	
		0.0094	17	2.31E-04	
			15	1.95E-04	
			13	1.67E-04	
			10	1.27E-04	
			7	8.80E-05	
			5	6.29E-05	
			3	4.11E-05	
			1	1.69E-05	
AVG		**0.0101**			**4.636**



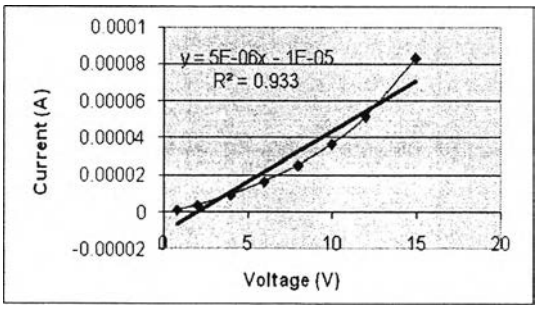
Sample	Specific Conductivities(S/cm)
1	5.129
2	5.798
3	4.636
Average	**5.187**
SD	**0.583**

Table D19 Conductivity measurement of doped PANI synthesized by conventional method at mole ratio between ANI:HCl equal to 1/200 (Geometric correction factor is 2.15E-04)

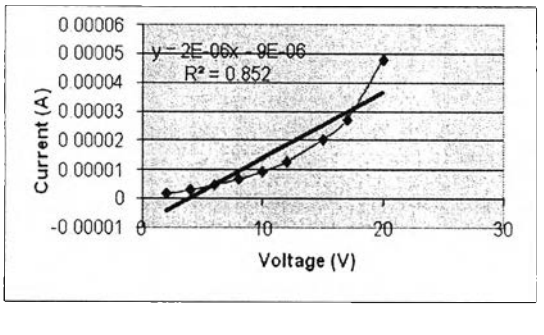
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/200	1	0.0084	27	1.81E-04	
		0.0081	24	1.57E-04	
		0.0080	20	1.22E-04	
		0.0084	17	1.08E-04	
		0.0082	14	9.54E-05	
			12	9.04E-05	
			10	7.79E-05	
			8	7.10E-05	
			2	6.40E-05	
			0.5	2.14E-05	
AVG		**0.0082**			**2.842**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/200	2	0.0075	15	8.3E-05	
		0.0076	12	5.14E-05	
		0.0074	10	3.66E-05	
		0.0078	8	2.54E-05	
		0.0074	6	1.66E-05	
			4	9.43E-06	
			2	3.78E-06	
			0.8	1.19E-06	
AVG		**0.0075**			**3.099**



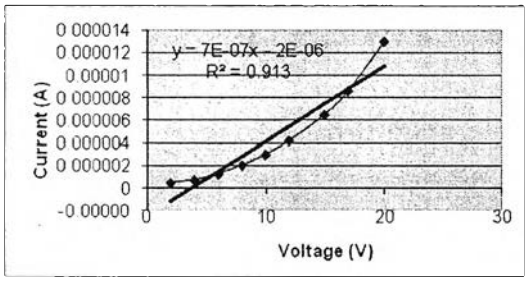
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/200	3	0.0097	20	4.78E-05	
		0.0097	17	2.70E-05	
		0.0091	15	2.02E-05	
		0.0088	12	1.26E-05	
		0.0088	10	9.23E-06	
			8	6.69E-06	
			6	4.62E-06	
			4	2.89E-06	
			2	1.65E-06	
AVG		**0.0092**			**1.014**



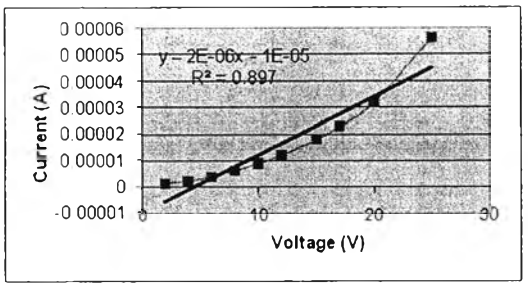
Sample	Specific Conductivities(S/cm)
1	2.842
2	3.099
3	1.014
Average	**2.318**
SD	**1.137**

Table D20 Conductivity measurement of doped PANI synthesized by conventional method at mole ratio between ANI:HCl equal to 1/300 (Geometric correction factor is 2.15E-04)

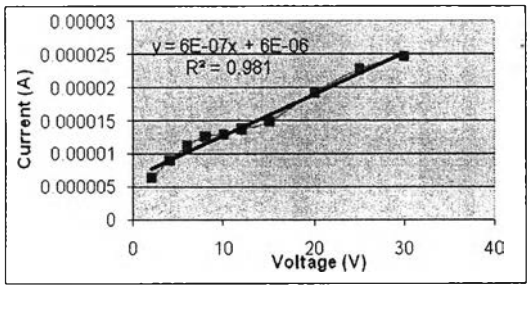
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/300	1	0.0075	20	1.3E-05	
		0.0073	17	8.64E-06	
		0.0079	15	6.52E-06	
		0.0078	12	4.23E-06	
		0.0077	10	2.99E-06	
			8	2.06E-06	
			6	1.29E-06	
			4	7.36E-07	
			2	4.79E-07	
AVG		**0.0076**			**0.428**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/300	2	0.0096	25	5.63E-05	
		0.0130	20	3.19E-05	
		0.0096	17	2.29E-05	
		0.0099	15	1.81E-05	
		0.0100	12	1.23E-05	
			10	9.08E-06	
			8	6.32E-06	
			6	4.17E-06	
			4	2.47E-06	
			2	1.62E-06	
AVG		**0.0104**			**0.897**



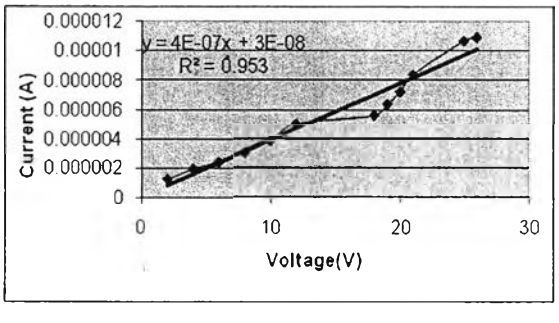
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/300	3	0.0084	30	2.47E-05	
		0.0081	25	2.27E-05	
		0.0065	20	1.92E-05	
		0.0081	15	1.49E-05	
		0.0080	12	1.37E-05	
			10	1.3E-05	
			8	1.26E-05	
			6	1.11E-05	
			4	8.92E-06	
			2	6.39E-06	
AVG		**0.0078**			**0.359**



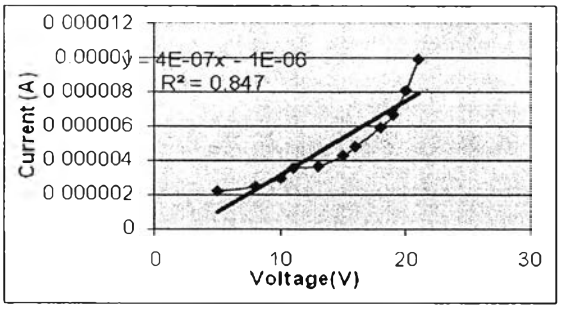
Sample	Specific Conductivities(S/cm)
1	0.428
2	0.897
3	0.359
Average	**0.561**
SD	**0.293**

Table D21 Conductivity measurement of doped PANI synthesized with ANI:Biosurfactant weight ratio of 22.7:1 at mole ratio between ANI:HCl equal to 1/100 and 4 hr polymerization time (Geometric correction factor is5.36E-05)

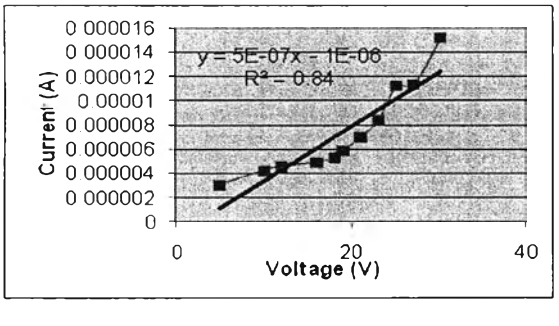
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	1	0.0100	26	1.09E-05	
		0.0105	25	1.06E-05	
		0.0106	21	8.35E-06	
		0.0100	20	7.17E-06	
		0.0100	19	6.32E-06	
			18	5.58E-06	
			12	4.97E-06	
			10	3.78E-06	
			8	2.99E-06	
			6	2.38E-06	
			4	1.92E-06	
			2	1.22E-06	
AVG		**0.01022**			**0.730**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A	Conductivity(S/cm)
1/100	2	0.0095	21	9.92E-06	
		0.0096	20	8.09E-06	
		0.0079	19	6.69E-06	
		0.0078	18	5.94E-06	
		0.0080	16	4.83E-06	
			15	4.3E-06	
			13	3.68E-06	
			11	3.58E-06	
			10	2.99E-06	
AVG		**0.00856**			**0.872**



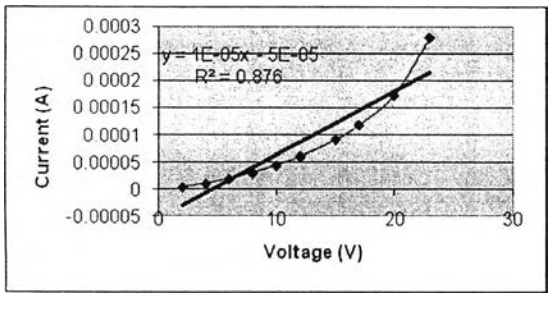
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	3	0.011	30	1.51E-05	
		0.013	27	1.13E-05	
		0.015	25	1.12E-05	
		0.0099	23	8.33E-06	
		0.013	21	6.99E-06	
			19	5.88E-06	
			18	5.33E-06	
			16	4.91E-06	
			12	4.58E-06	
			10	4.25E-06	
			5	3.07E-06	
AVG		**0.01238**			**0.754**



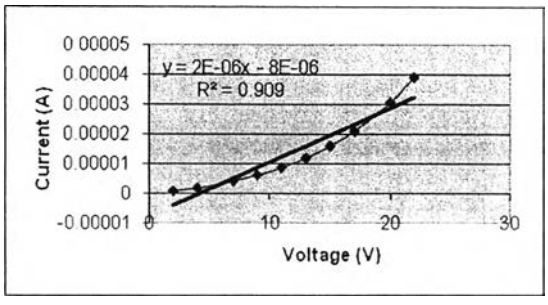
Sample	Specific Conductivities(S/cm)
1	0.730
2	0.872
3	0.754
Average	**0.785**
SD	**0.076**

Table D22 Conductivity measurement of doped PANI synthesized with ANI:Biosurfactant weight ratio of 22.7:1 at mole ratio between ANI:HCl equal to 1/100 and 8 hr polymerization time (Geometric correction factor is 2.14E-04)

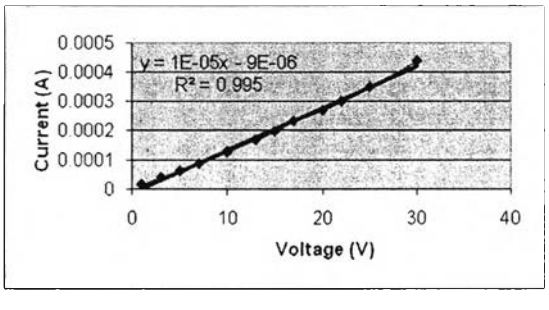
ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	1	0.0083	23	2.79E-04	
		0.0081	20	1.73E-04	
		0.0077	17	1.18E-04	
		0.0082	15	9.07E-05	
		0.008	12	6.03E-05	
			10	4.40E-05	
			8	3.05E-05	
			6	1.94E-05	
			4	1.06E-05	
			2	3.98E-06	
AVG		**0.00806**			**5.798**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	2	0.0074	22	3.9E-05	
		0.0075	20	3.06E-05	
		0.0071	17	2.09E-05	
		0.0071	15	1.6E-05	
		0.0069	13	1.19E-05	
			11	8.69E-06	
			9	6.18E-06	
			7	4.2E-06	
			4	1.85E-06	
			2	8.37E-07	
AVG		**0.0072**			**1.298**



ANI:HCl	Order	Thickness(mm)	Voltage (v)	Current(A)	Conductivity(S/cm)
1/100	3	0.0104	30	4.36E-04	
		0.0102	25	3.48E-04	
		0.0102	22	2.98E-04	
		0.0102	20	2.68E-04	
		0.0094	17	2.31E-04	
			15	1.95E-04	
			13	1.67E-04	
			10	1.27E-04	
			7	8.80E-05	
			5	6.29E-05	
			3	4.11E-05	
			1	1.69E-05	
AVG		**0.01008**			**4.673**



Sample	Specific Conductivities(S/cm)
1	5.798
2	1.298
3	4.673
Average	**3.923**
SD	**2.342**

CURRICULUM VITAE

Name: Ms. Panisara Worakitsiri

Date of Birth: July 15, 1986

Nationality: Thai

University Education:

2004-2007 Bachelor's Degree of Engineering, Faculty of Engineering and Industrial Technology, Silpakorn University, Nakornprathom, Thailand

Proceeding:

1. Worakitsiri, P.; Pornsunthorntawee, O.; Thanpitcha, T.; Chavadej, S.; Weder, C.; and Rujiravanit, R. (2010, April 22) Biosurfactant Mediated Synthesis of Conductive Polymeric Nanoparticles. Proceedings of the 1st National Research Symposium on Petroleum, Petrochemicals, and Advanced Materials and the 16th PPC Symposium on Petroleum, Petrochemicals, and Polymers, Bangkok, Thailand.

Presentation:

1. Worakitsiri, P.; Pornsunthorntawee, O.; Thanpitcha, T.; Chavadej, S.; Weder, C.; and Rujiravanit, R. (2009, August 23 - 25) Biosurfactant Mediated Synthesis of Conductive Polymeric Nanoparticles. Paper presented at the 4th International Symposium in Science and Technology at Kansai University 2009, Osaka, Japan.