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APPENDICES

APPENDIX A

ADDITIONAL INFORMATION OF CHAPTER II

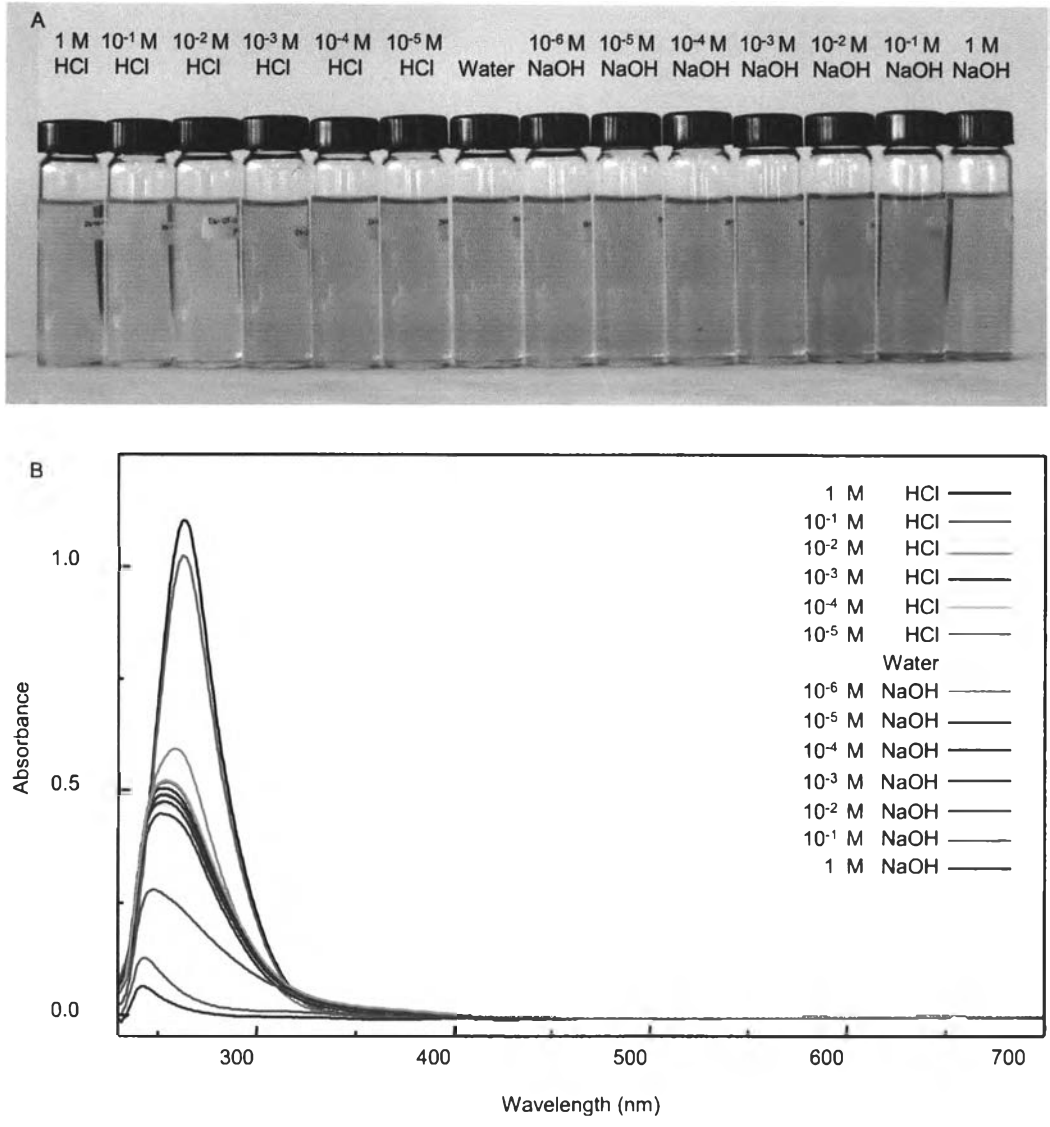


Figure 1 (A) Digital image of platinum solution in acidic-alkaline condition and (B) UV/vis spectra of platinum solution at various acidic-alkaline conditions at room temperature for 14 days.

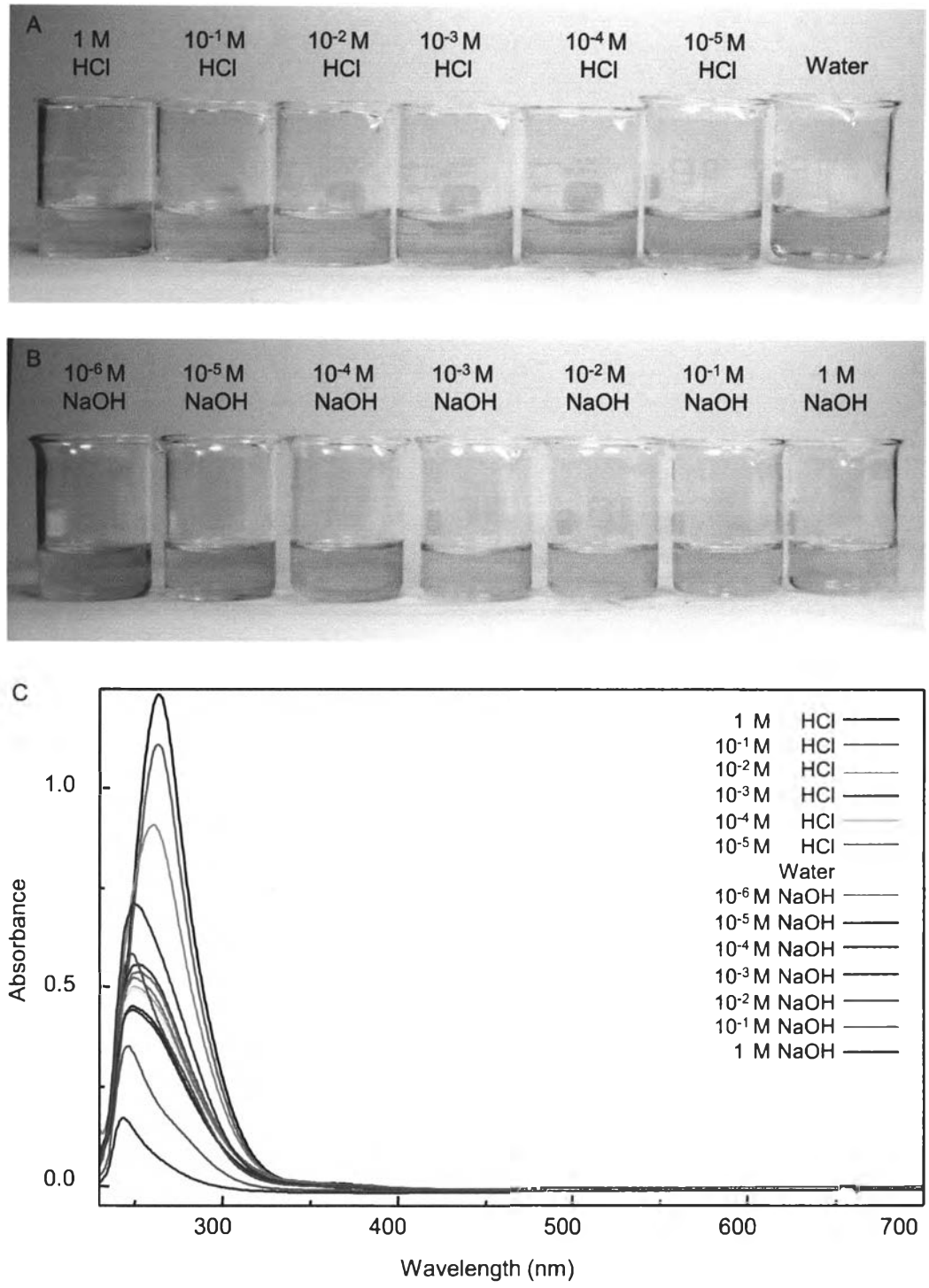


Figure 2 (A) Digital image of platinum solution in acidic condition, (B) digital image of platinum solution in alkaline condition, and (C) UV/vis spectra of platinum solution at various acidic-alkaline conditions at 50°C.

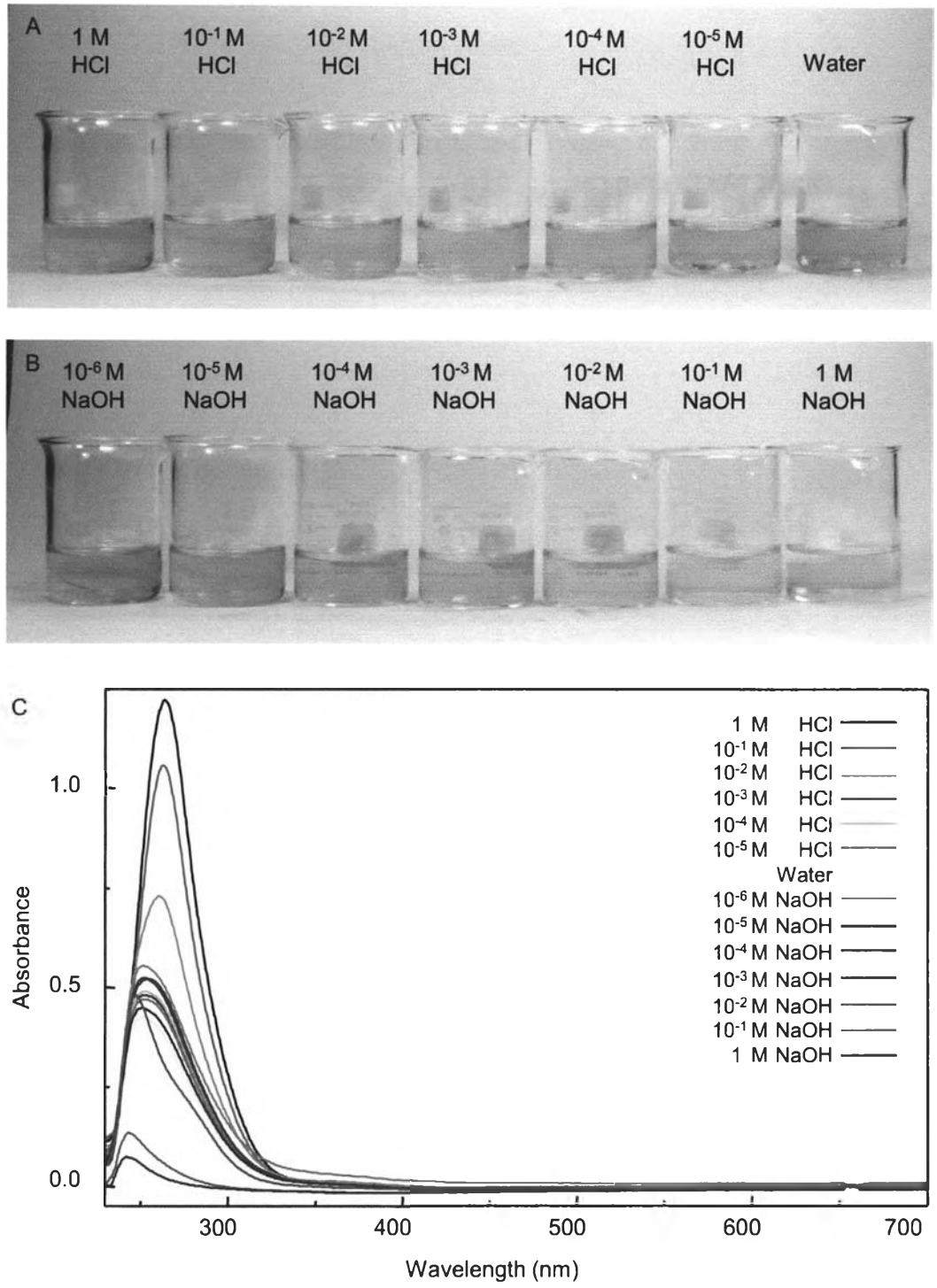


Figure 3 (A) Digital image of platinum solution in acidic condition, (B) digital image of platinum solution in alkaline condition, and (C) UV/vis spectra of platinum solution at various acidic-alkaline conditions at 75°C.

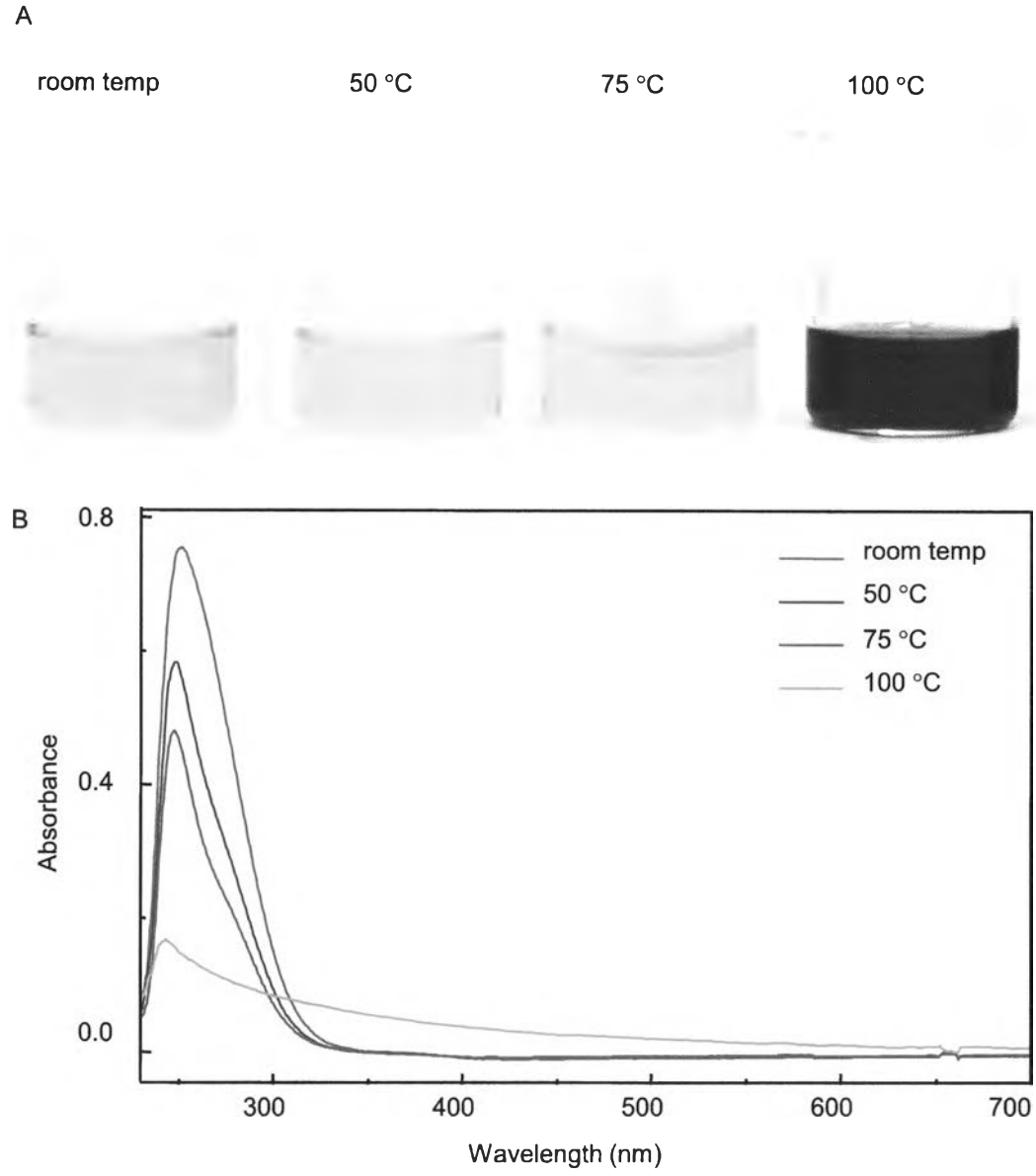


Figure 4 (A) Digital image and (B) UV/vis spectra of platinum solution after reduction at various temperatures under alkaline conditions (0.05 M NaOH) after reduction and digital images of platinum solution after reduction.

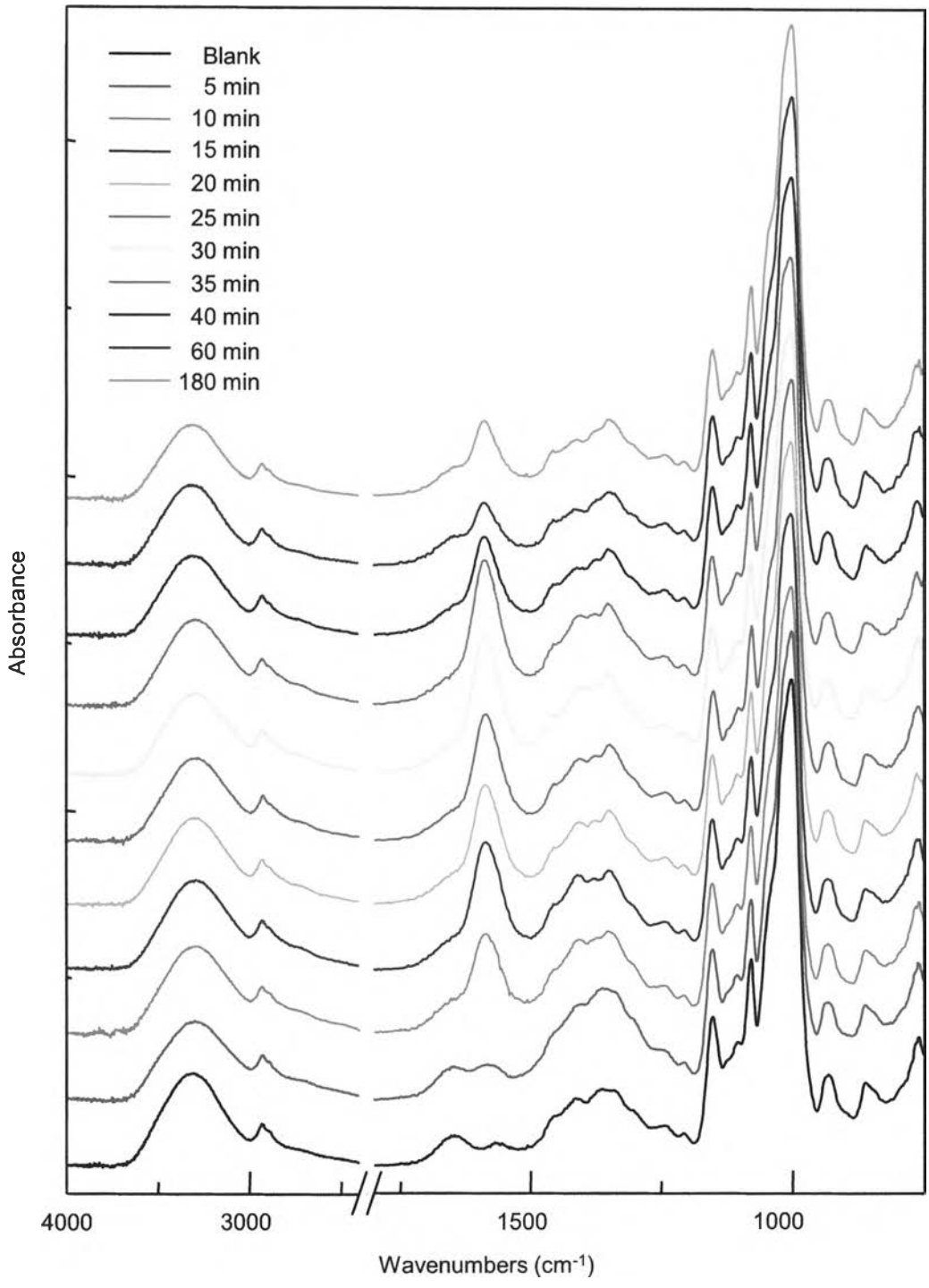


Figure 5 Normalized ATR FT-IR stack spectra of soluble starch at various incubation times with 0.05 M NaOH.

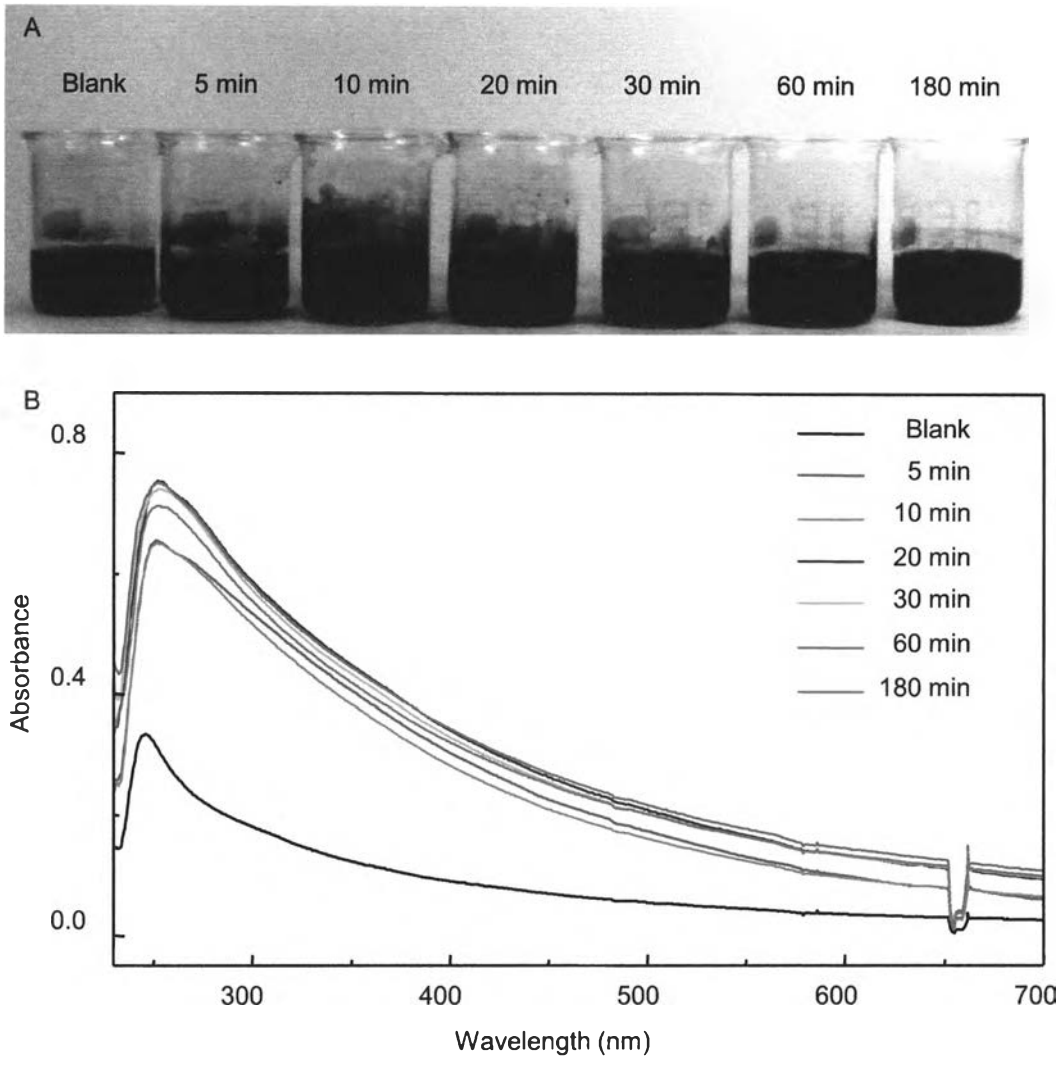


Figure 6 (A) Digital image and (B) UV/vis spectra of colloidal Pt NPs reduced by intermediate degradation product of soluble starch under alkaline condition (0.05 M NaOH) at various incubation times.

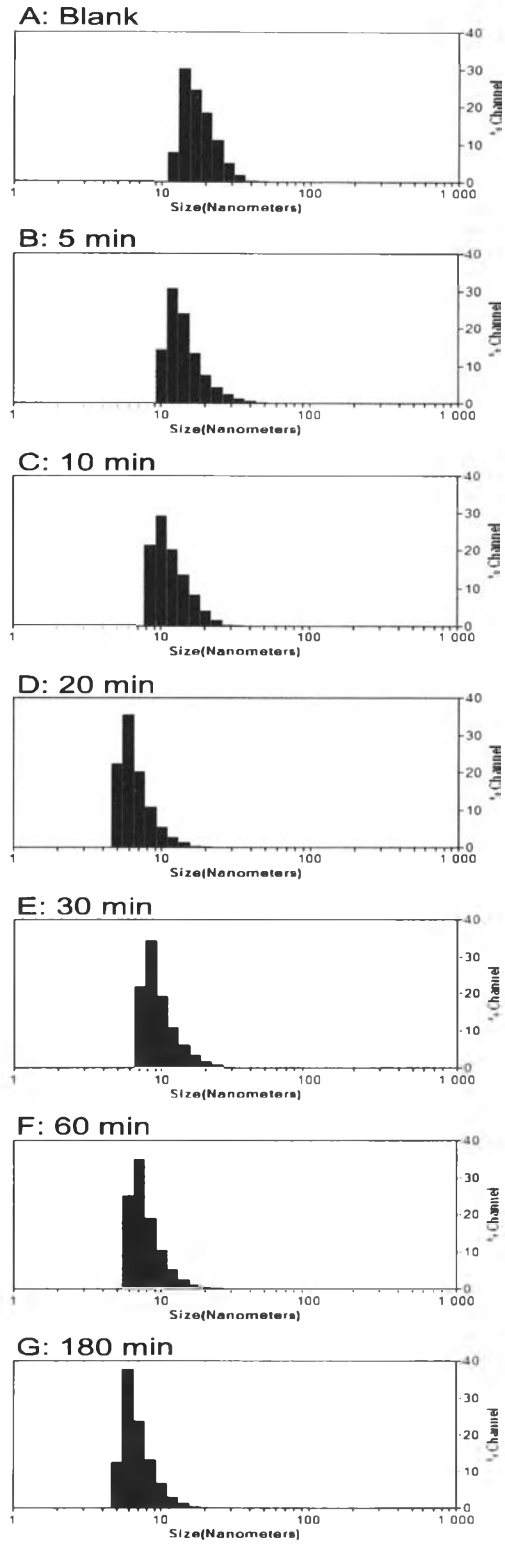


Figure 7 Dynamic light scattering of colloidal Pt NPs reduced by intermediate degradation product of soluble starch under alkaline condition (0.05 M NaOH) at various incubation times.

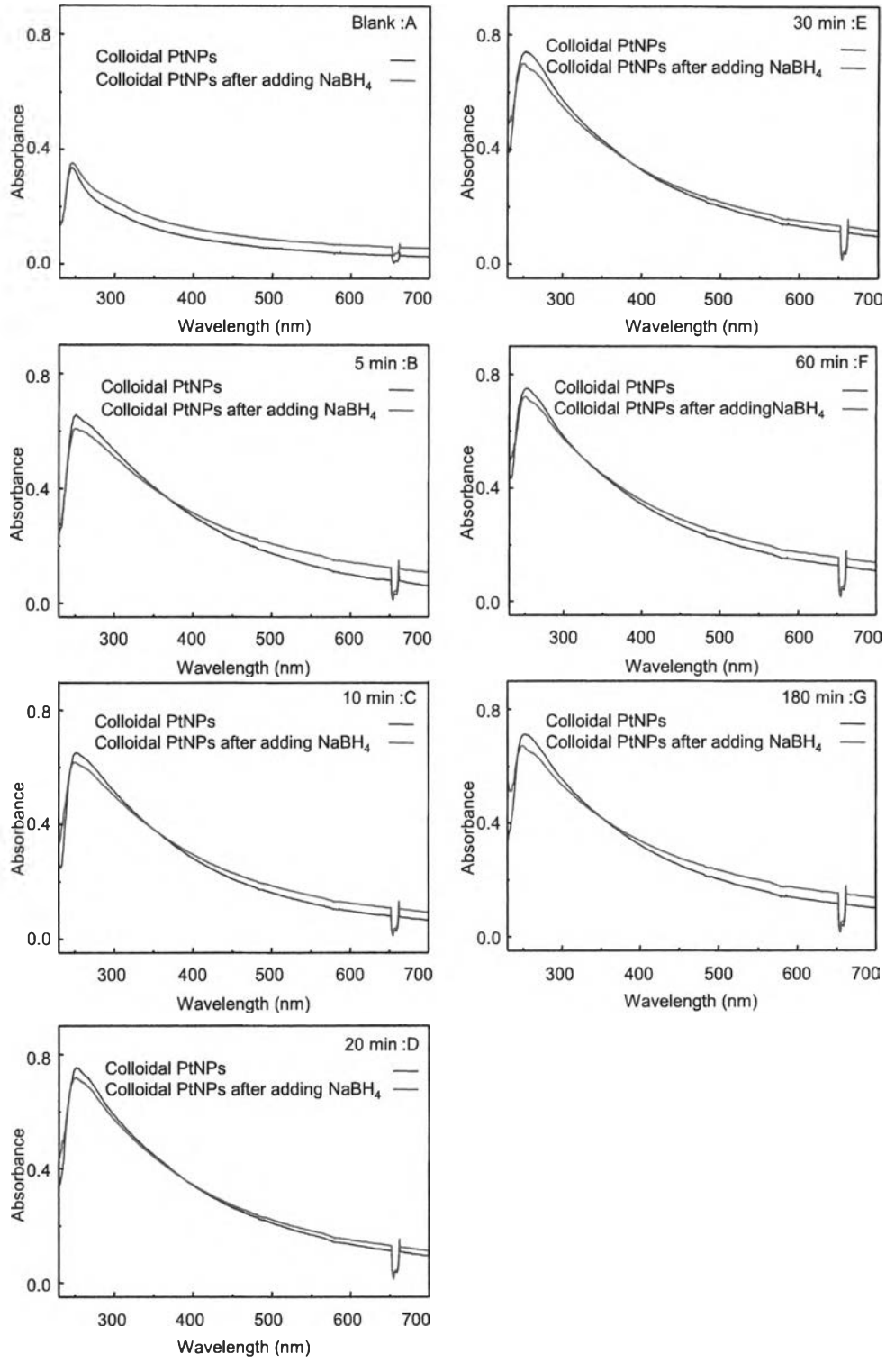


Figure 8 UV/vis spectra of colloidal Pt NPs reduced by intermediate degradation product of soluble starch under alkaline condition (0.05 M NaOH) at various incubation times before and after checking the completely of the reduction with $NaBH_4$.

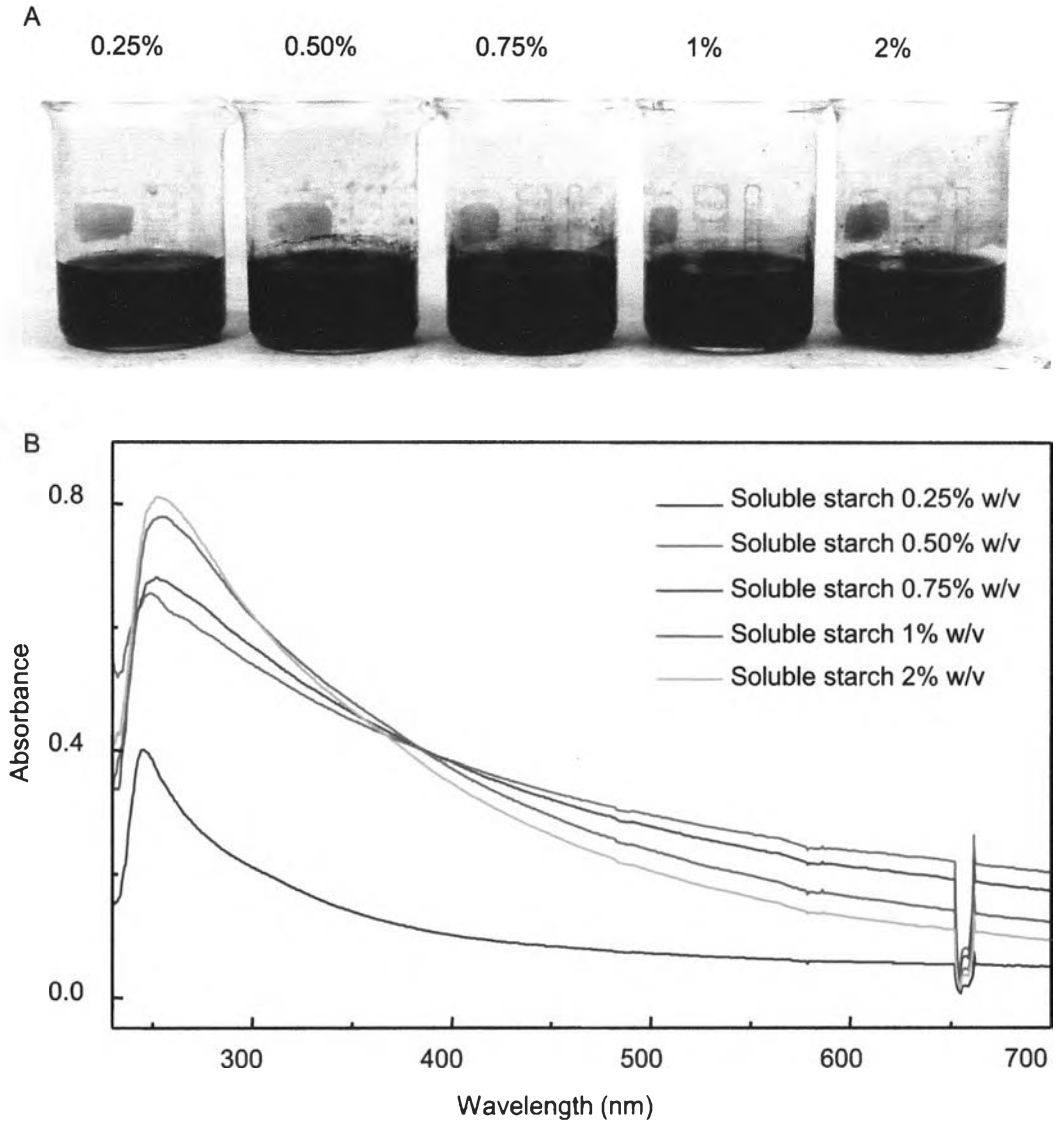


Figure 9 (A) Digital image and (B) UV/vis spectra of colloidal Pt NPs reduced by soluble starch (0.25-2% w/v) under alkaline condition (0.05 M NaOH).

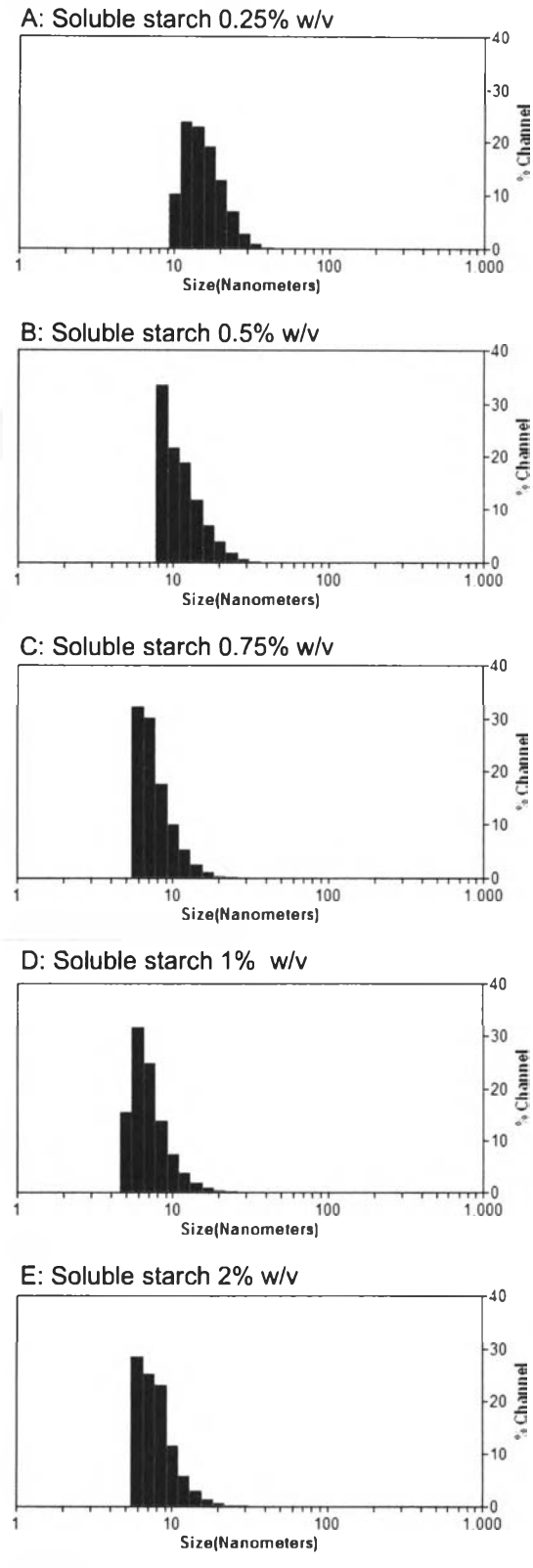


Figure 10 Dynamic light scattering of colloidal Pt NPs reduced by soluble starch (0.25-2% w/v) under alkaline condition (0.05 M NaOH).

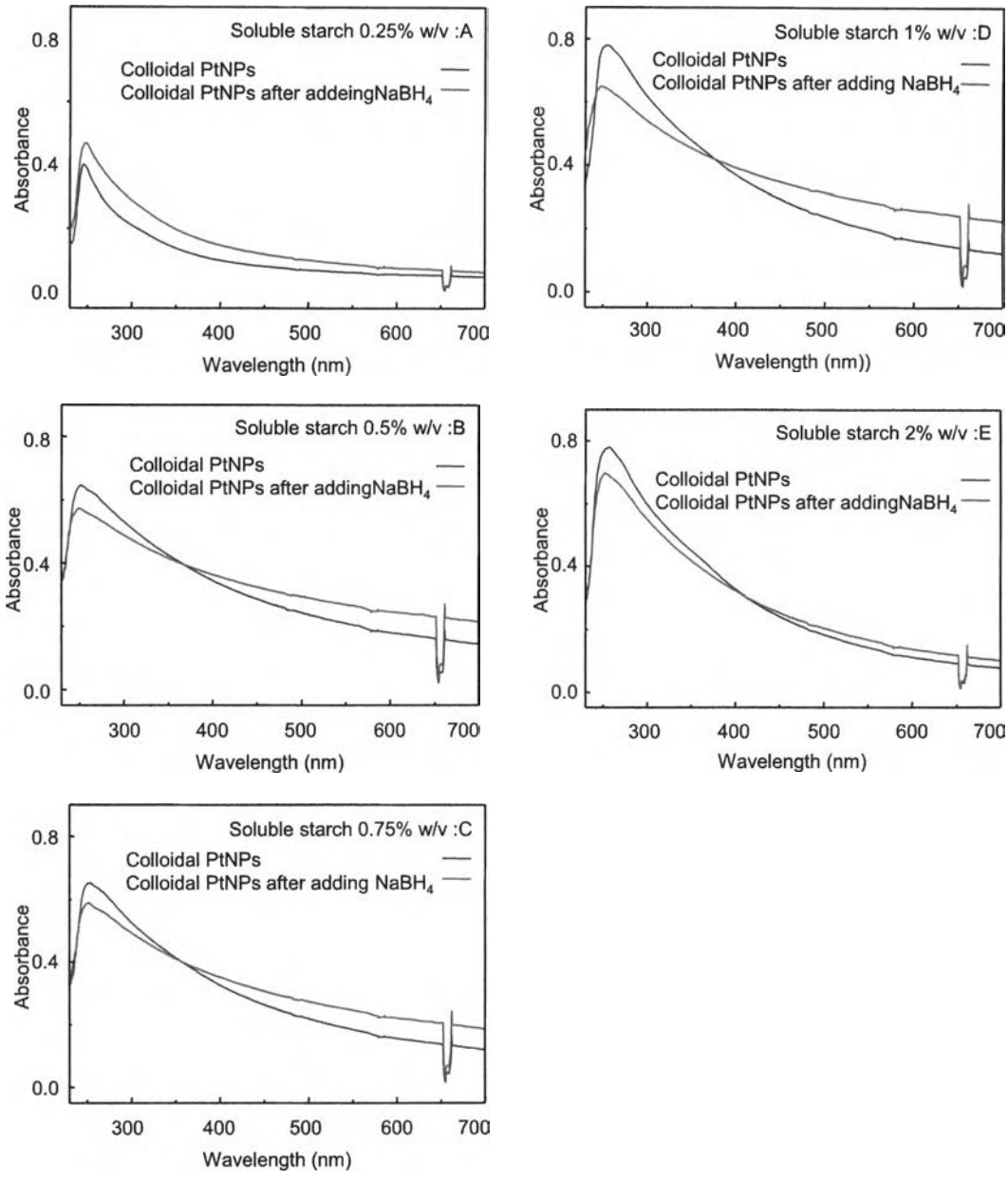


Figure 11 UV/vis spectra of colloidal Pt NPs reduced by reduced by soluble starch (0.25-2% w/v) under alkaline condition (0.05 M NaOH) before and after checking the completely of the reduction with $NaBH_4$.

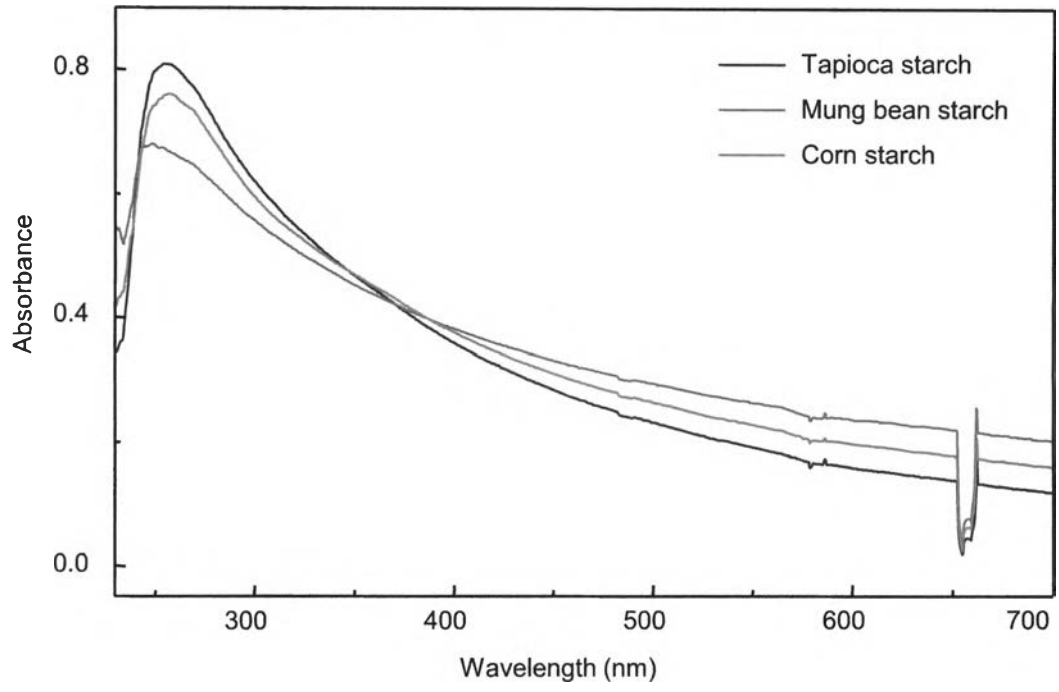


Figure 12 UV/vis spectra of colloidal Pt NPs reduced with various type of starch (i.e., tapioca, mung bean, and corn starch) under alkaline condition (0.05 M NaOH).

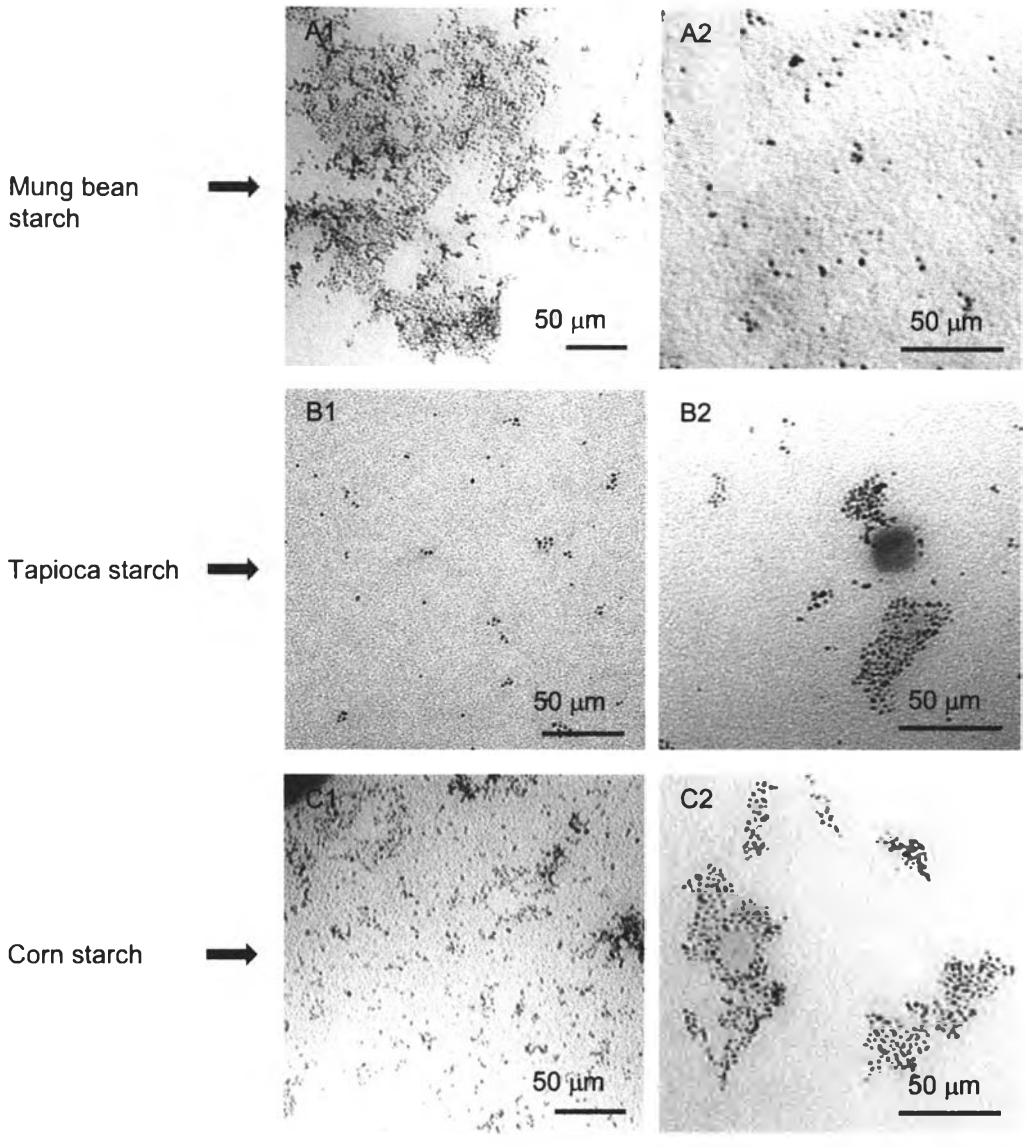


Figure 13 (A) TEM images of colloidal Pt NPs reduced with (A) mung bean starch (2% w/v), (B) tapioca starch (2% w/v), and (C) corn starch (2% w/v) under alkaline condition (0.05 M NaOH).

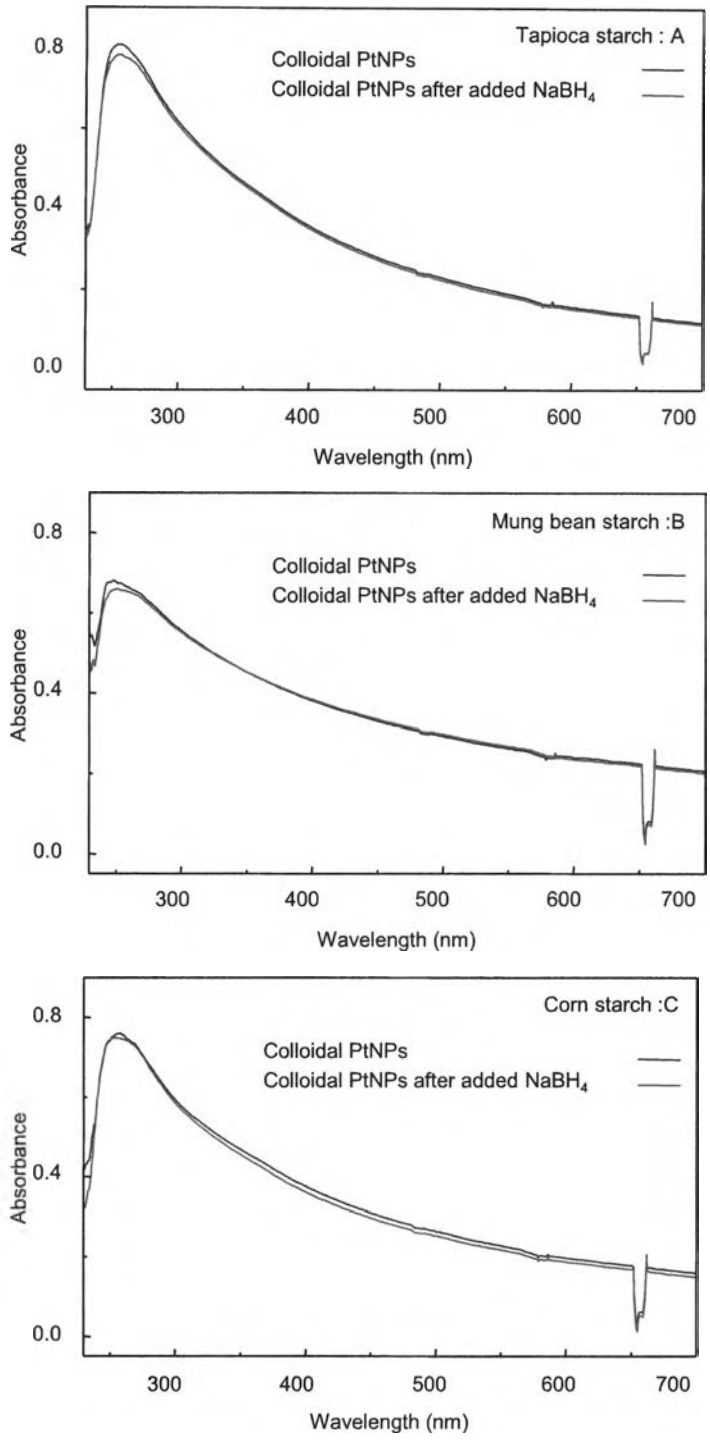


Figure 14 UV/vis spectra of colloidal Pt NPs reduced with various type of starch under alkaline condition (0.05 M NaOH) before and after checking the completely of the reduction with $NaBH_4$.

APPENDIX B

ADDITIONAL INFORMATION OF CHAPTER III

Table 1 Results of glycerol oxidation catalyst by Pt NPs/HT preparing with various refluxed times.

Pt/HT Catalyst	Compound name	Conversion (%)	Selectivity (%)	Yield (%)
0.5 hr	Glycerol	50.1		
	Glyceric acid (GA)		76.0	37.0
	Tartronic acid (TA)		7.2	3.3
	Glycolic acid (HA)		11.5	5.4
	Oxalic acid (OA)		5.2	2.4
1 hr	Glycerol	55.4		
	Glyceric acid (GA)		74.5	41.3
	Tartronic acid (TA)		9.0	5.0
	Glycolic acid (HA)		7.2	4.0
	Oxalic acid (OA)		9.4	5.2
2 hr	Glycerol	64.0		
	Glyceric acid (GA)		64.6	41.3
	Tartronic acid (TA)		9.0	5.7
	Glycolic acid (HA)		11.4	7.3
	Oxalic acid (OA)		8.9	5.7
3 hr	Glycerol	69.6		
	Glyceric acid (GA)		63.1	44
	Tartronic acid (TA)		1.1	0.8
	Glycolic acid (HA)		12.5	8.7
	Oxalic acid (OA)		10.1	7.0
Reaction conditions: glycerol (0.5 mmol), H_2O (5 mL), glycerol/metal = 600 (mol/mol), 1 wt% metal, under O_2 flow (10 mL/min), 333 K, 6 h.				

Table 2 Results of glycerol oxidation catalyst by Pt NPs/HT preparing with various drying times.

Pt/HT Catalyst	Compound name	Conversion (%)	Selectivity (%)	Yield (%)
6 hr	Glycerol	67.1		
	Glyceric acid (GA)		62.1	41.7
	Tartronic acid (TA)		1.4	0.9
	Glycolic acid (HA)		14.1	9.5
	Oxalic acid (OA)		10.8	7.3
12 hr	Glycerol	58.1		
	Glyceric acid (GA)		68.5	39.8
	Tartronic acid (TA)		9.1	5.3
	Glycolic acid (HA)		13.0	7.5
	Oxalic acid (OA)		9.4	5.5
24 hr	Glycerol	54.7		
	Glyceric acid (GA)		70.5	38.6
	Tartronic acid (TA)		9.4	5.1
	Glycolic acid (HA)		11.1	6.1
	Oxalic acid (OA)		9.0	4.9
48 hr	Glycerol	57.4		
	Glyceric acid (GA)		68.4	39.3
	Tartronic acid (TA)		8.6	4.9
	Glycolic acid (HA)		11.6	6.7
	Oxalic acid (OA)		9.0	5.2
Reaction conditions: glycerol (0.5 mmol), H_2O (5 mL), glycerol/metal = 600 (mol/mol), 1 wt% metal, under O_2 flow (10 mL/min), 333 K, 6 h.				

Table 3 Results of glycerol oxidation catalyst by Pt NPs/HT (Pt/HT = 0.5-2% w/w).

Pt/HT Catalyst	Compound name	Conversion (%)	Selectivity (%)	Yield (%)
0.5 wt%	Glycerol	13.2		
	Glyceric acid (GA)		87.7	11.6
	Tartronic acid (TA)		0.4	0.0
	Glycolic acid (HA)		11.7	1.5
	Oxalic acid (OA)		0.2	0.0
1.0 wt%	Glycerol	55.0		
	Glyceric acid (GA)		69.8	38.4
	Tartronic acid (TA)		8.5	4.7
	Glycolic acid (HA)		12.6	7.0
	Oxalic acid (OA)		9.1	5.0
2.0 wt%	Glycerol	66.2		
	Glyceric acid (GA)		65.9	43.6
	Tartronic acid (TA)		3.3	2.2
	Glycolic acid (HA)		12.7	8.4
	Oxalic acid (OA)		11.2	7.4
Reaction conditions: glycerol (0.5 mmol), H_2O (5 mL), glycerol/metal = 600 (mol/mol), 1 wt% metal, under O_2 flow (10 mL/min), 333 K, 6 h.				

APPENDIX C

ADDITIONAL INFORMATION OF CHAPTER V

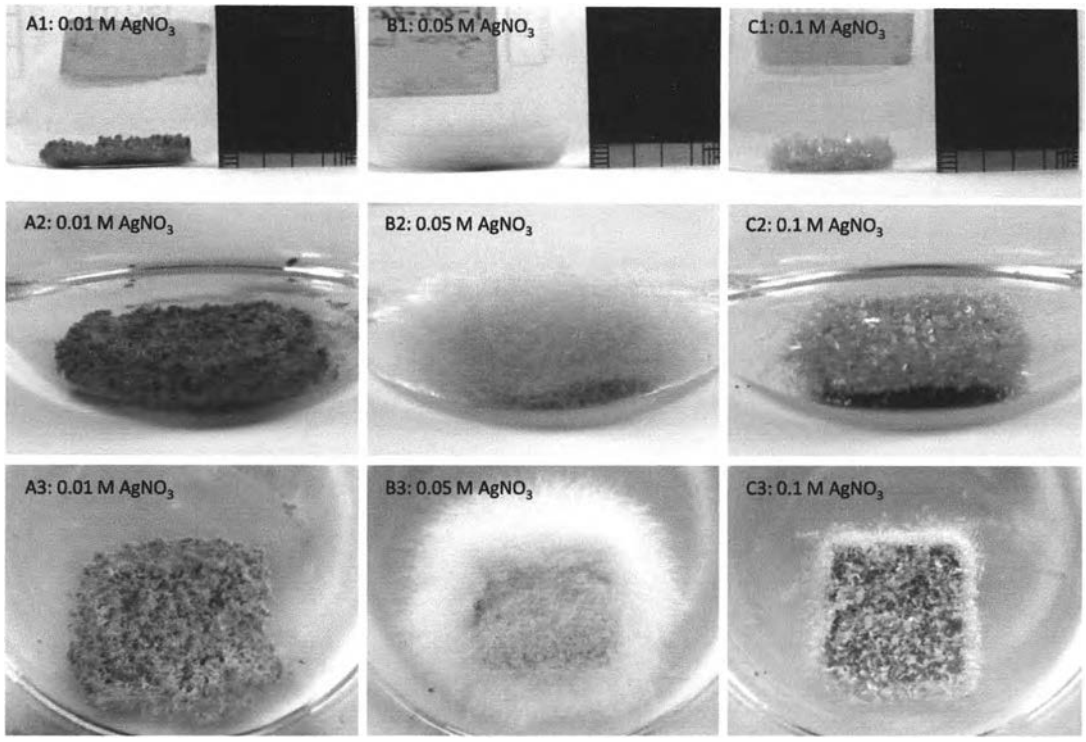


Figure1 Digital images of silver microstructures obtained after a 24 h galvanic reaction of aluminum foils (1.5 cm × 1.5 cm × 30 μm) and $AgNO_3$ solutions: (A) 0.01 M, (B) 0.05 M (C) 0.10 M.

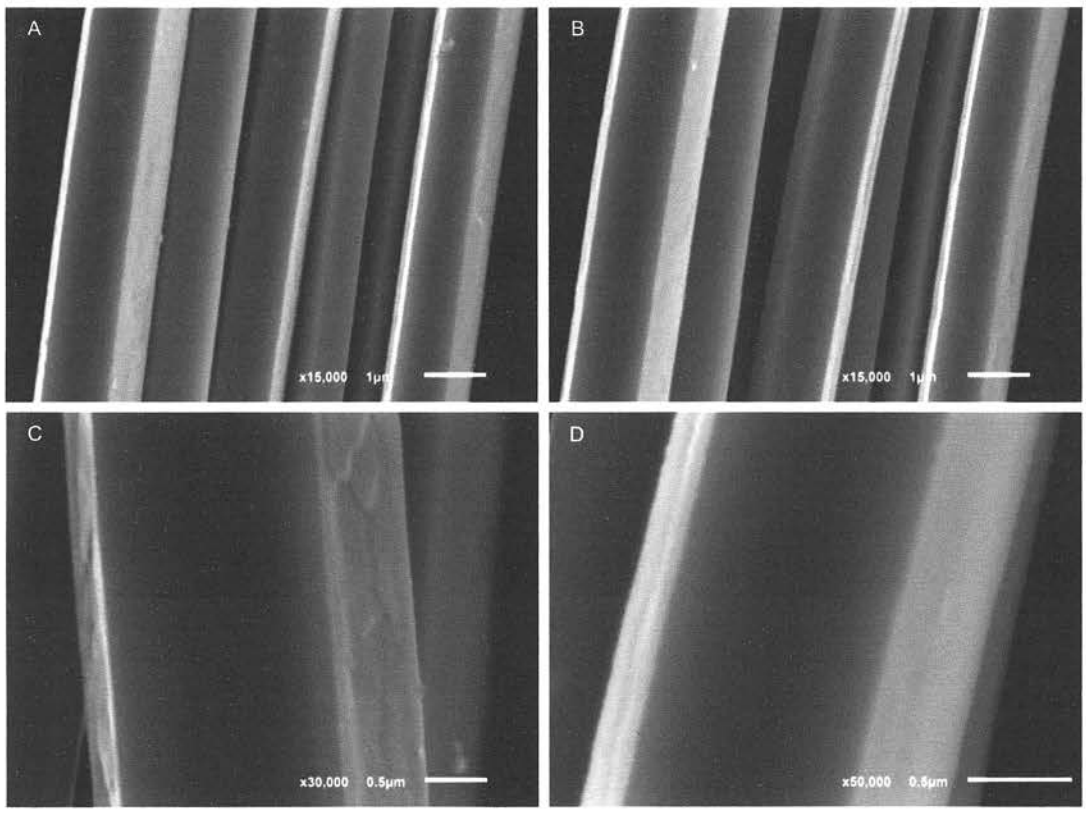
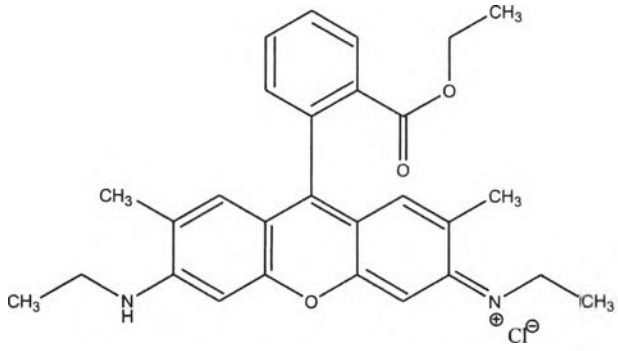


Figure 2 High magnification SEM micrographs of silver fibers surface.



Chemical structure of Rhodamin 6G

Raman condition: Laser: 532 nm, laser power: 1 mW, aperture: 50 μm pinhole, exposure time: 1 second, lens: 20x.

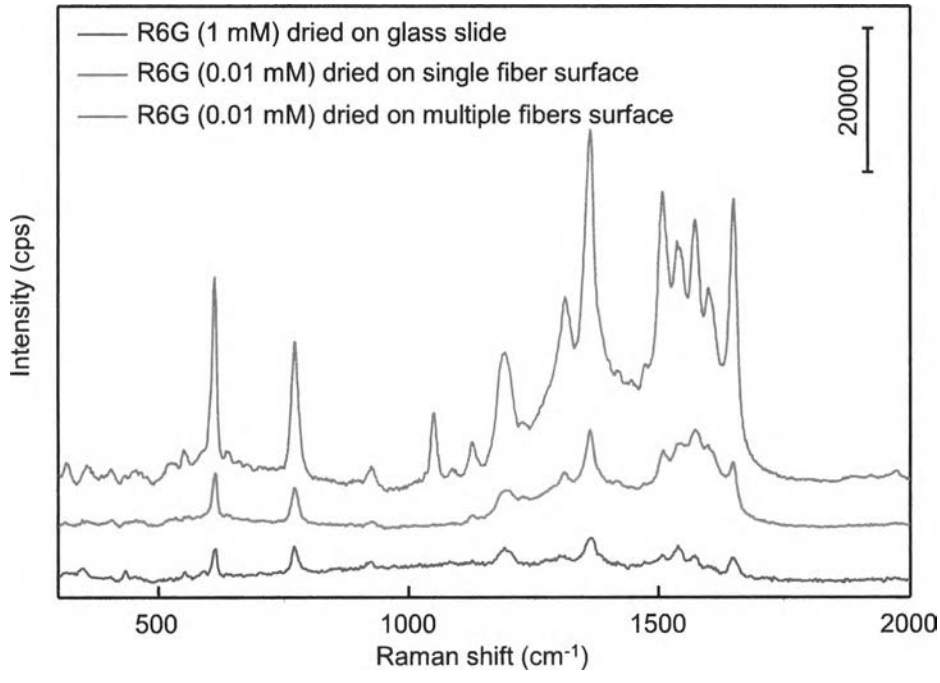
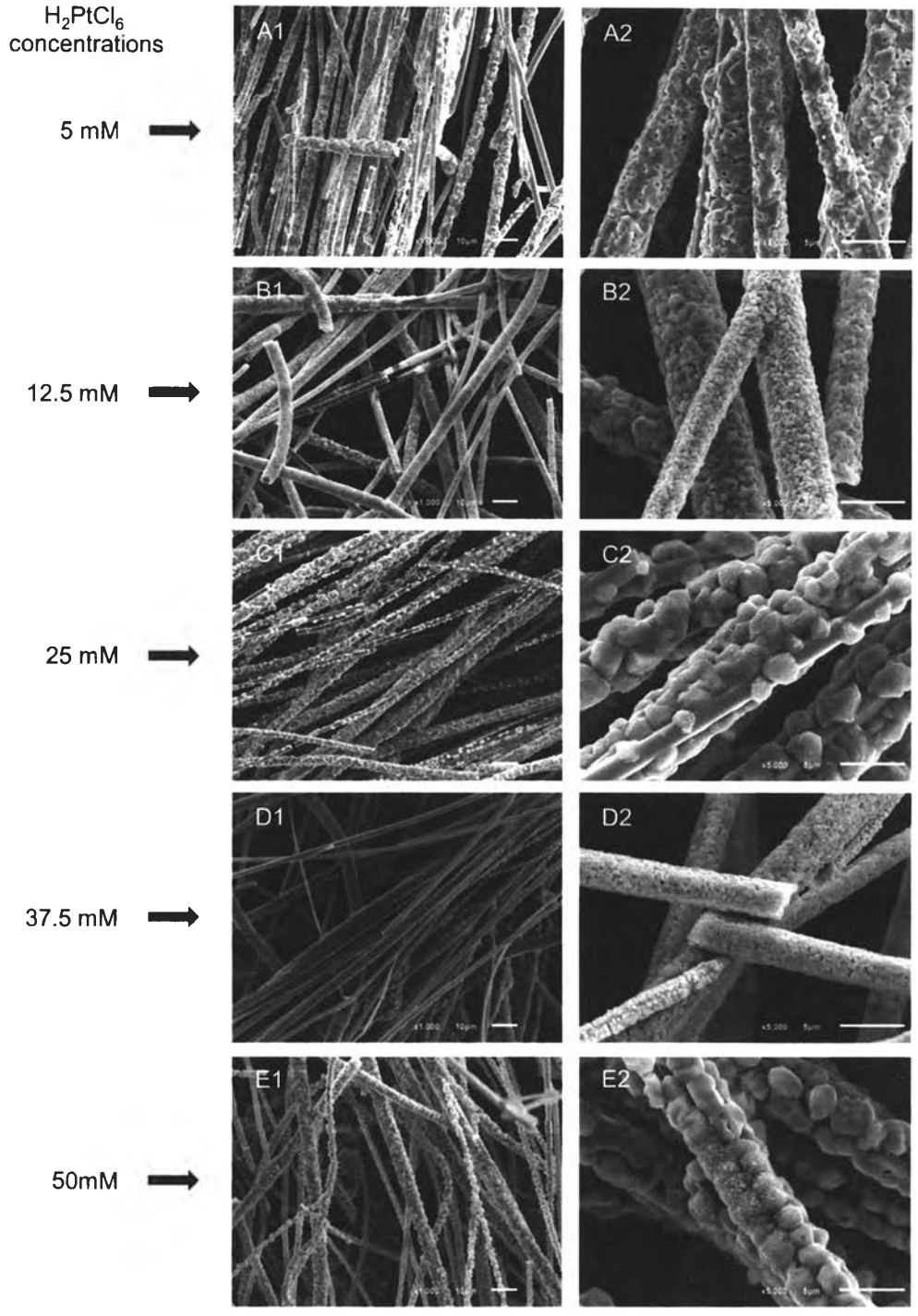
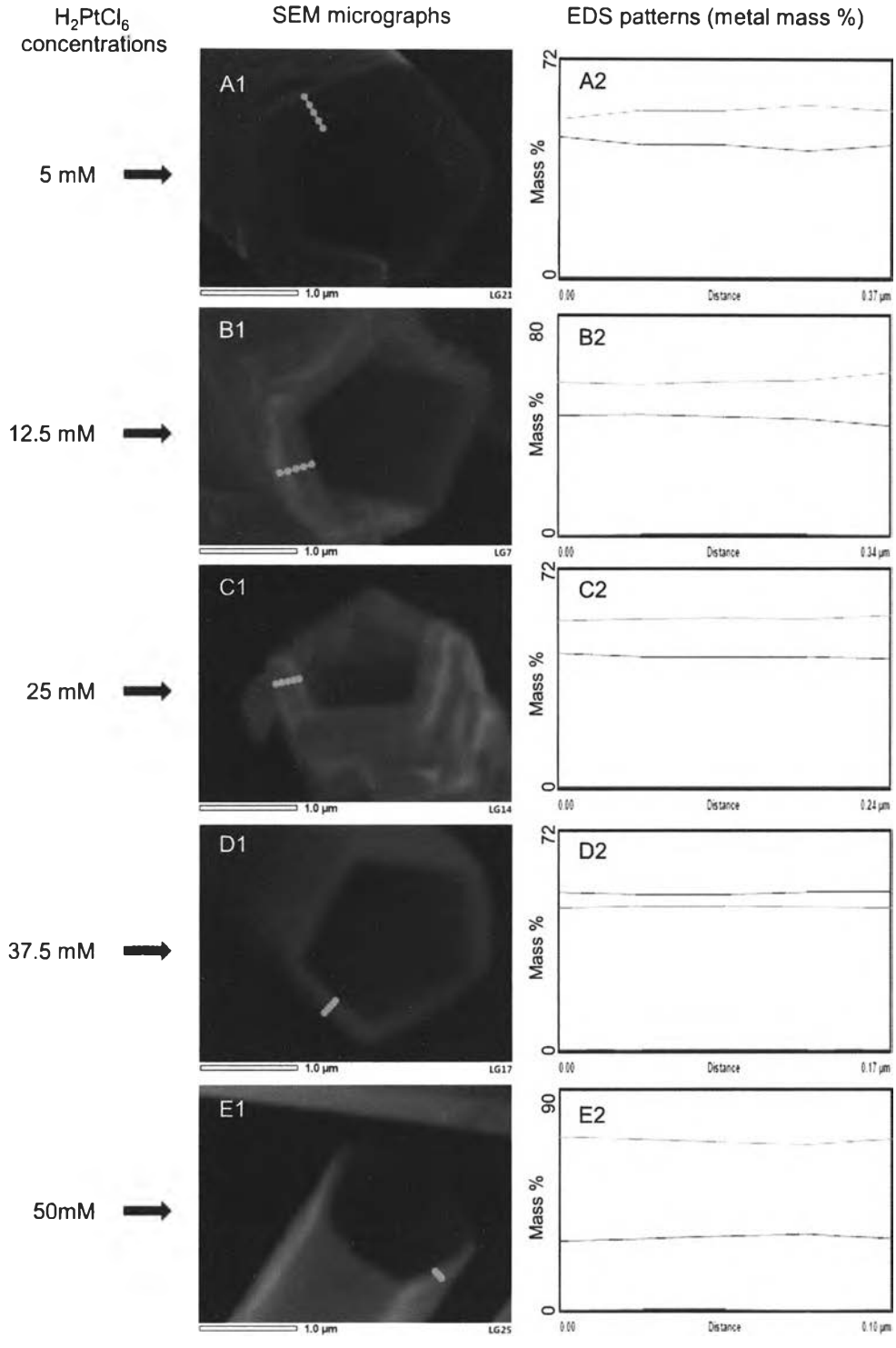


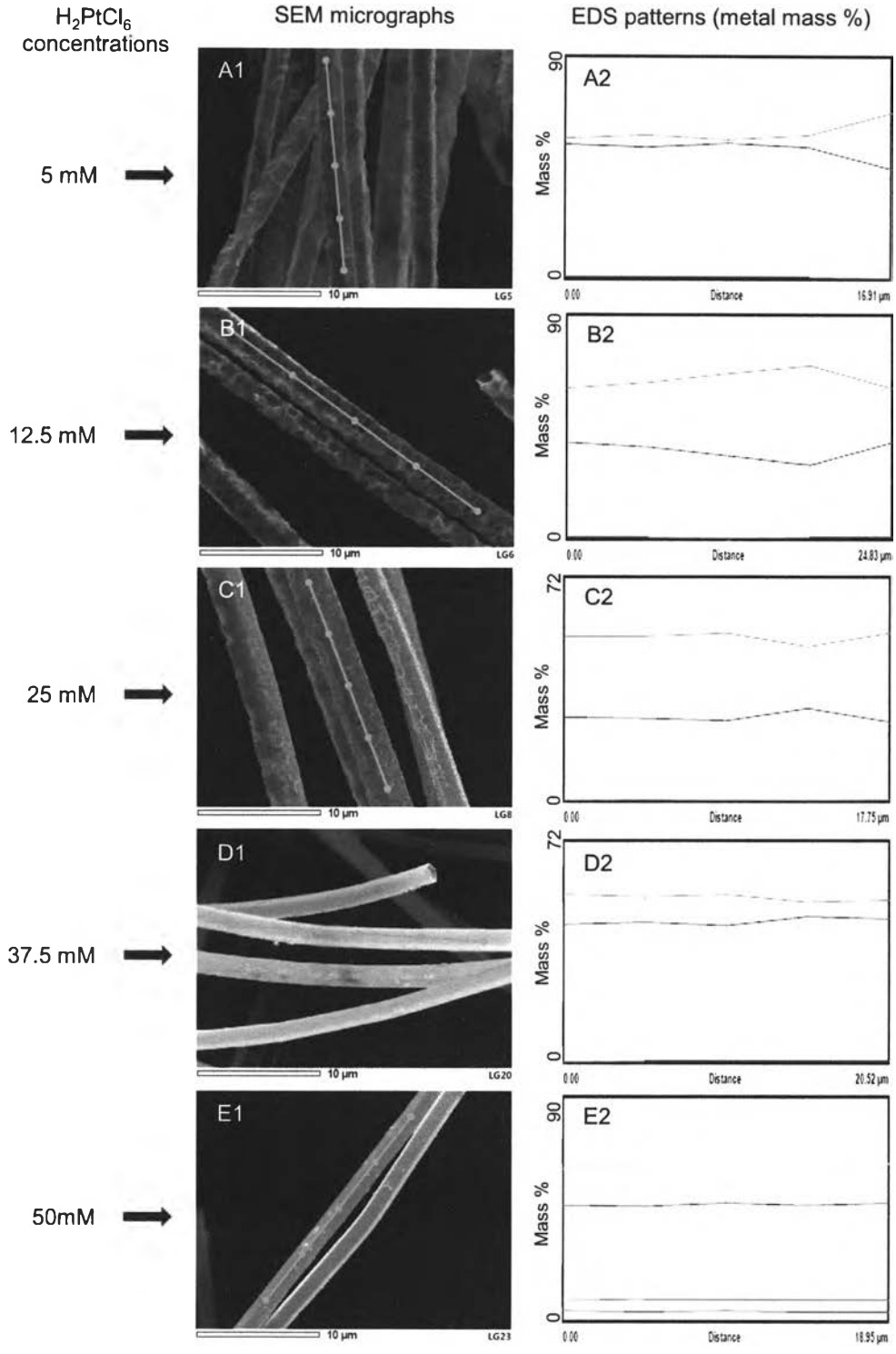
Figure 3 Raman spectra of R6G dried on single pentagonal microfiber and multiple pentagonal microfibers. A Raman spectrum of bulk R6G (1 mM in water) dried on glass slide presented as a reference.



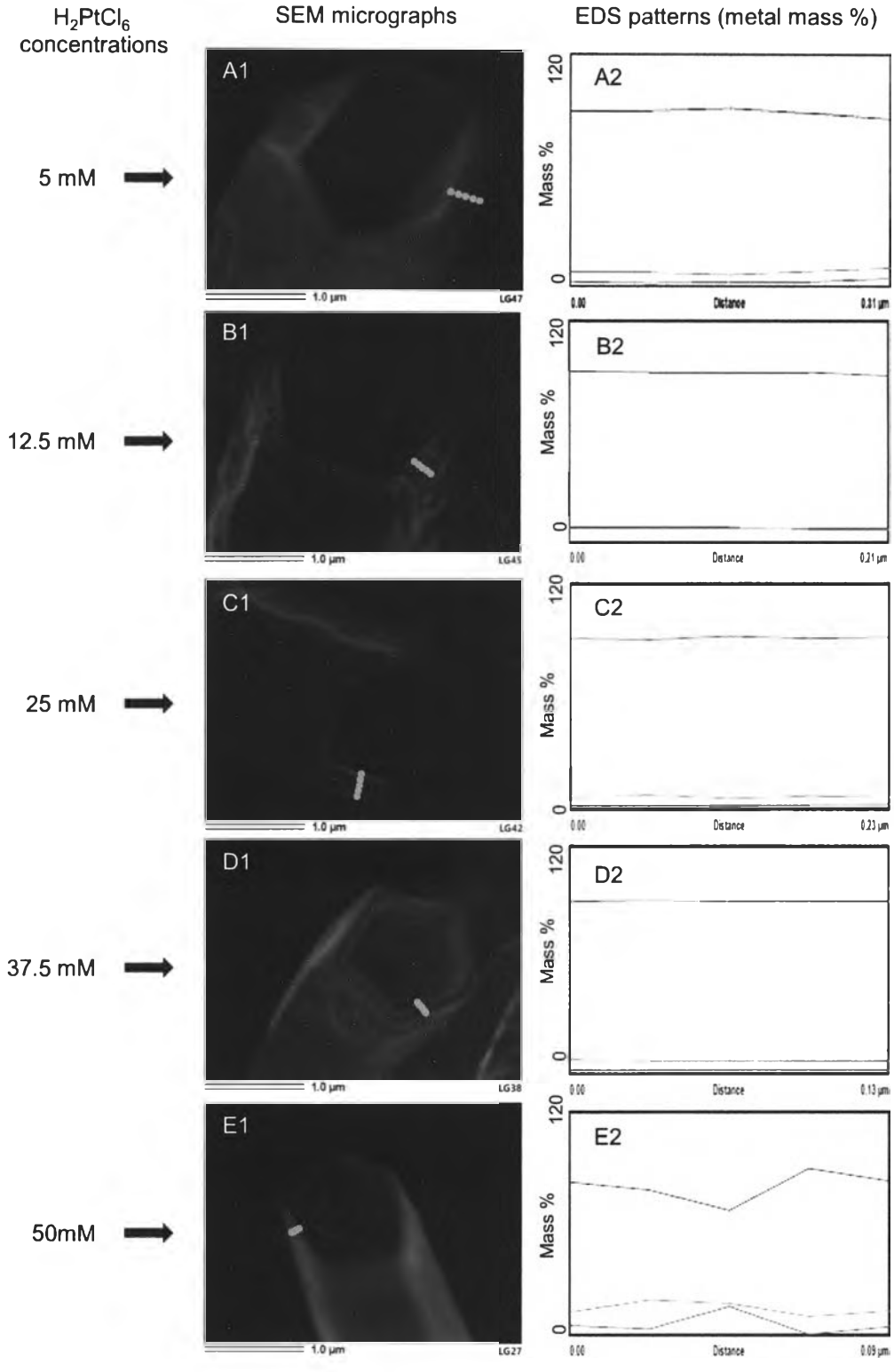
Figures 4 SEM micrographs of galvanic generated platinum microfibers on the surface of silver fibers with hexachloroplatinic acid (H_2PtCl_6): (A) 5 mM, (B) 12.5 mM, (C) 25 mM, (D) 37.5 mM, (E) 50 mM.



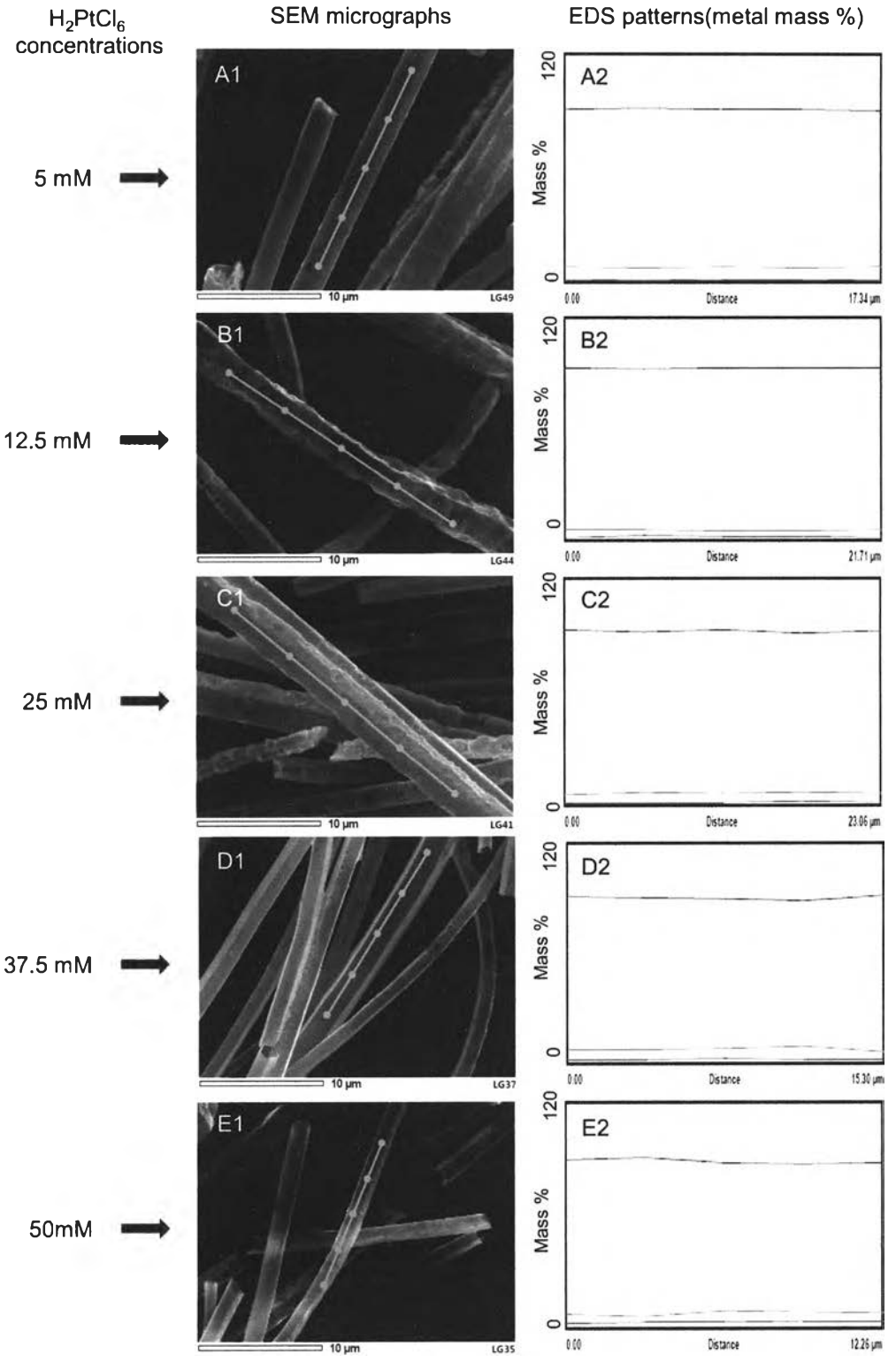
Figures 5 SEM micrographs and EDS patterns (metal mass %) of galvanic generated platinum microfibers edge after cleaning with ammonia solution (10% v/v). SEM micrographs scale bar: 1 µm. EDS pattern colors: (green) silver, (blue) platinum, (red) chloride.



Figures 6 SEM micrographs and EDS patterns (metal mass %) of galvanic generated platinum microfibers surface after cleaning with ammonia solution (10% v/v). SEM micrographs scale bar: 1 µm. EDSs pattern color: (green) silver, (blue) platinum, (red) chloride.



Figures 7 SEM micrographs and EDS patterns (metal mass %) of galvanic generated platinum microfibers edge after cleaning with nitric acid (2 M). SEM micrographs scale bar: 1 µm. EDS patterns color: (green) silver, (blue) platinum, (red) chloride.



Figures 8 SEM micrographs and EDS patterns (metal mass %) of galvanic generated platinum microfibers surface after cleaning with nitric acid (2 M). SEM micrographs scale bar: 1 µm. EDS patterns color: (green) silver, (blue) platinum, (red) chloride.

VITAE

Miss Duangta Tongsakul was born on May 2, 1983 in Kanchanaburi, Thailand. She graduated with Bachelor Degree of Engineering Program in Petrochemistry and Polymeric Materials from Faculty of Engineering and Industrial Technology, Silpakorn University in 2005 and Master Degree of Science in Petrochemistry and Polymer Science Program in 2006, Faculty of Science, Chulalongkorn University. She continued her study in Petrochemistry Program in 2007, Faculty of Science, Chulalongkorn University and completed in 2011. During her studies towards the Degree of Doctor of Philosophy program in Petrochemistry, she was supported by the Thailand Research Fund under The Royal Golden Jubilee Ph.D. Program, Thailand during 2007-2011, and supported by the Dual Ph.D Program between Chulalongkorn University and Japan Advanced Institute of Science and Technology (JAIST), Japan during 2010-1012. She was awarded conference scholarship in 2011 by the Graduate School, Chulalongkorn University and Faculty of Science, Chulalongkorn University for oral presentation in "The AIChE Annual Meeting", Minneapolis, Minnesota, USA on 16–21 October, 2011 which organized by American Institute of Chemical Engineers. She was awarded the "Young Chemist awards" supported by IUPAC, RSC, and Bangkok Bank from the 14th Asian Chemical Congress 2011 (14 ACC).