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APPENDICES

Appendix A Thermal Gravimetric Analysis (TGA)

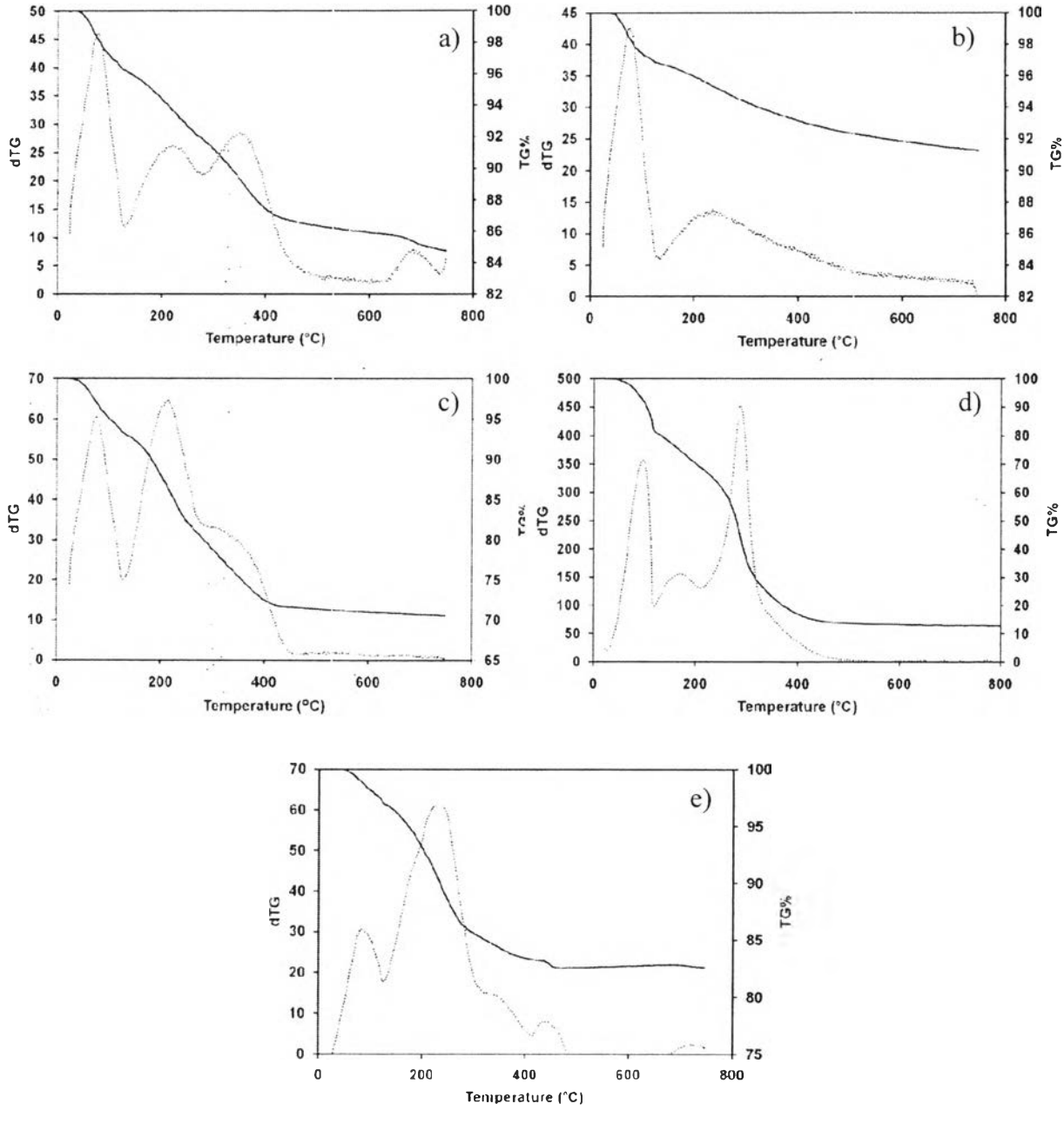

Figure A1 TGA profiles of prepared catalysts a) Pd/Al_2O_3, b) Pt/Al_2O_3, c) Cu/Al_2O_3, d) $NiCu/Al_2O_3$, and e) $NiMo/Al_2O_3$; dTG(····), TG(—).

Appendix B X-ray Diffraction (XRD)

The XRD characterization was performed to identify unique metal oxide species of the studied catalysts. The XRD patterns of the catalysts were illustrated in Figure B1-B7.

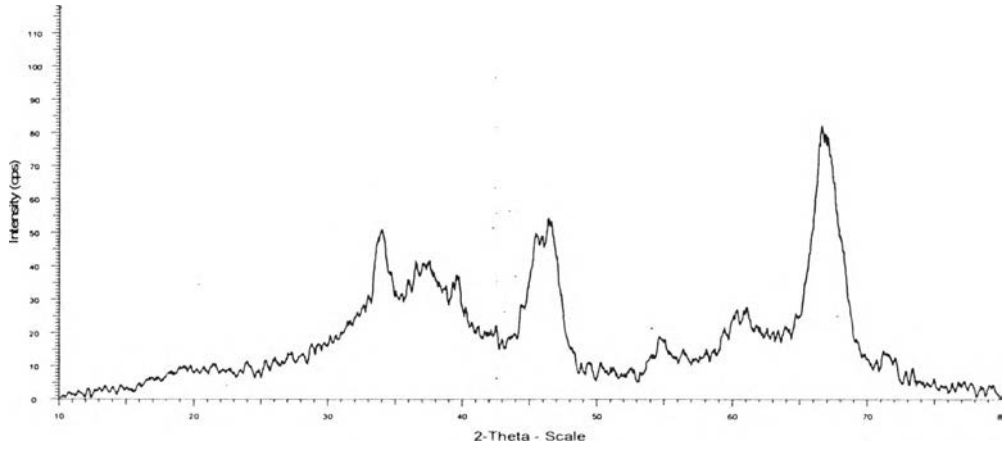

Figure B1 The XRD patterns of the Pd/Al_2O_3.

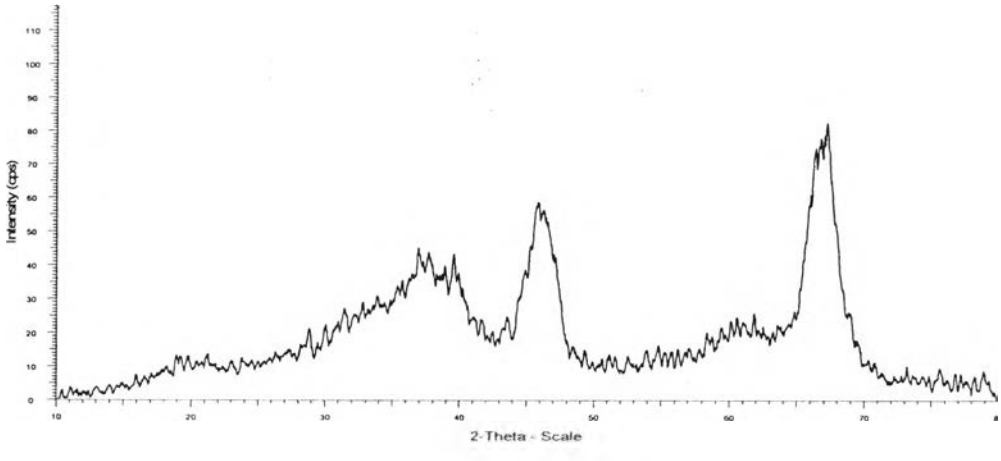

Figure B2 The XRD patterns of the Pt/Al_2O_3.

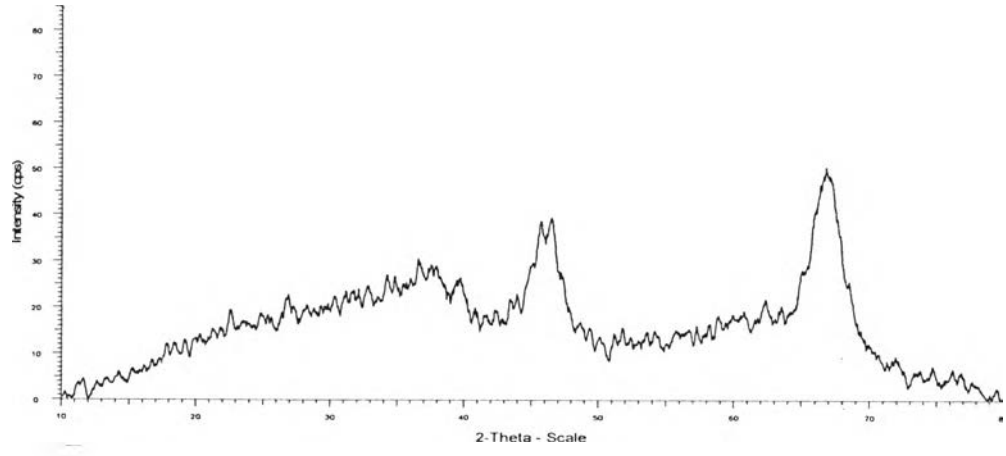

Figure B3 The XRD patterns of the Ni-W/Al_2O_3.

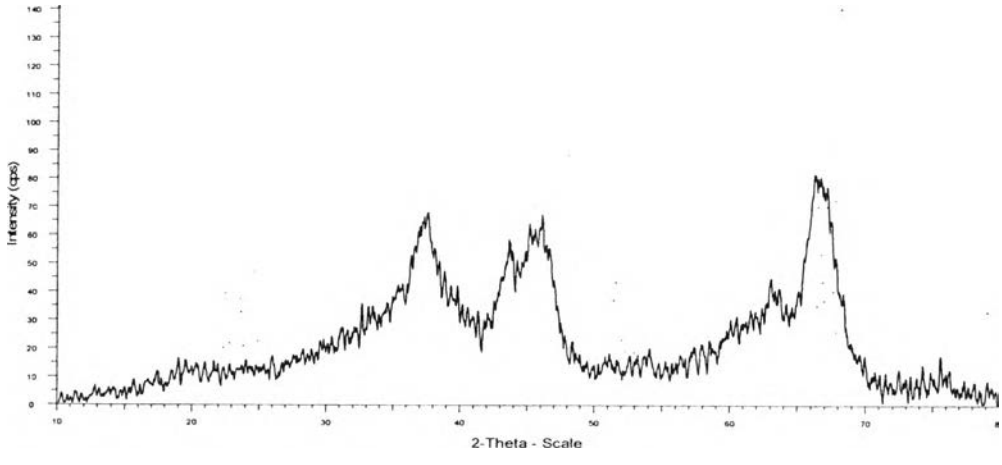

Figure B4 The XRD patterns of the Ni-Cu/Al_2O_3.

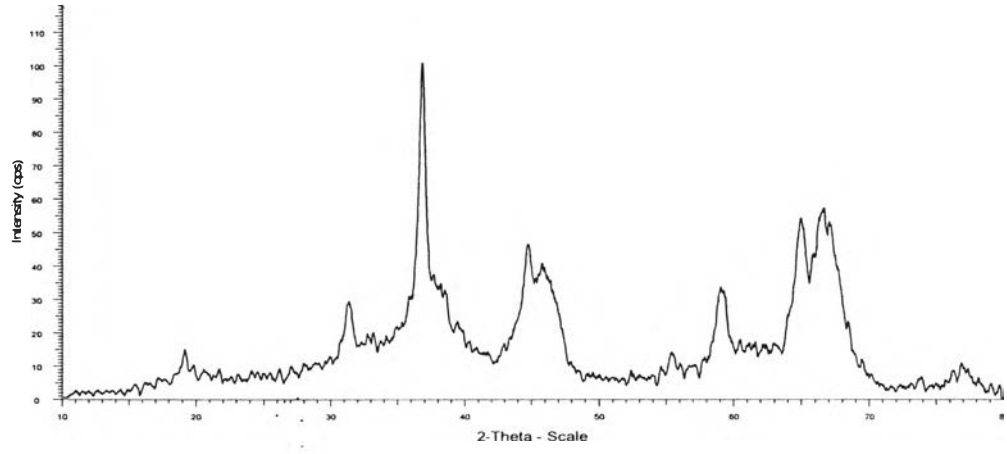

Figure B5 The XRD patterns of the Ni-Co/Al_2O_3.

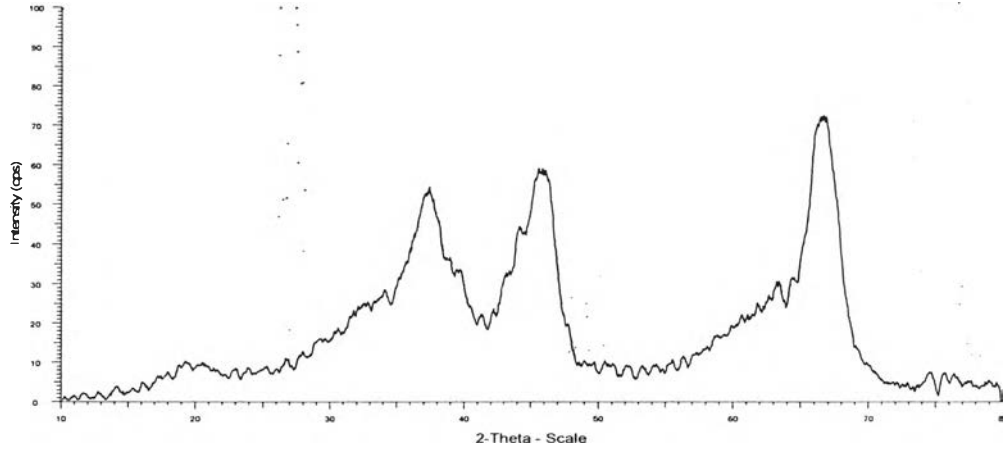

Figure B6 The XRD patterns of the Ni/Al_2O_3.

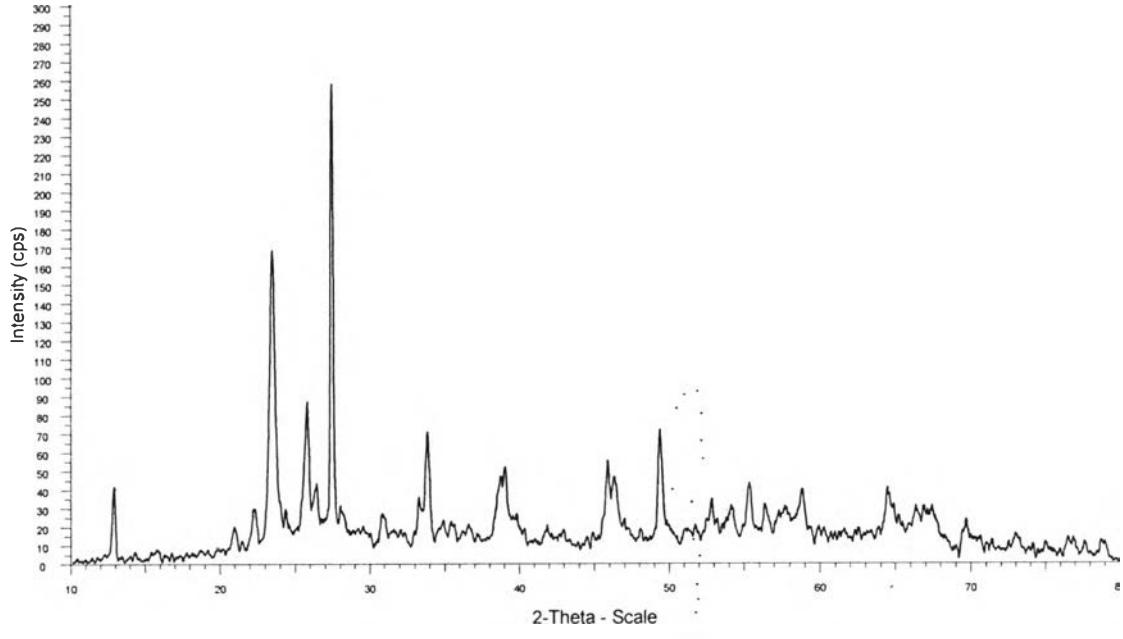

Figure B7 The XRD patterns of the Cu-Mo/Al_2O_3.

Appendix C Scanning Electron Microscope (SEM)

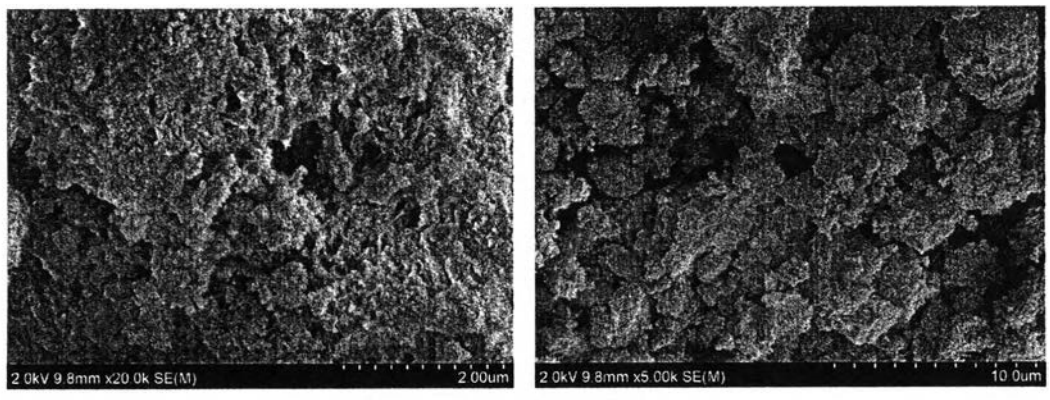

Figure C1 SEM image of Al_2O_3

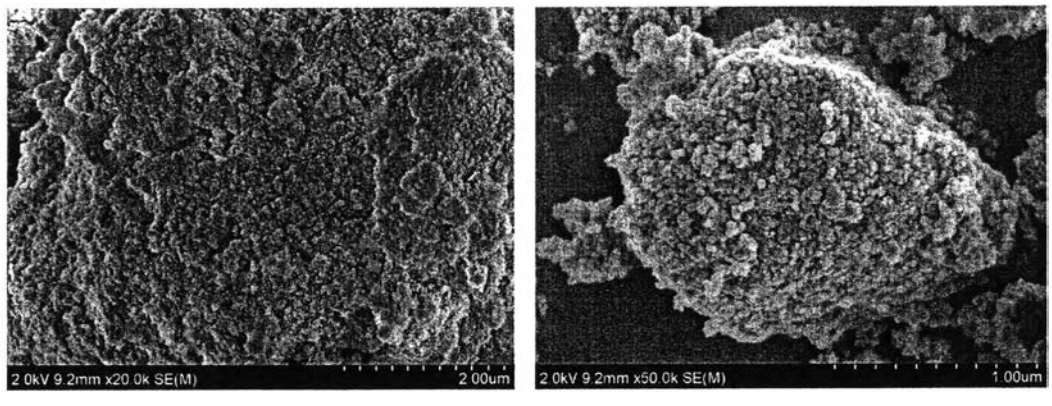

Figure C2 SEM image of Ni/Al_2O_3 (Fresh).

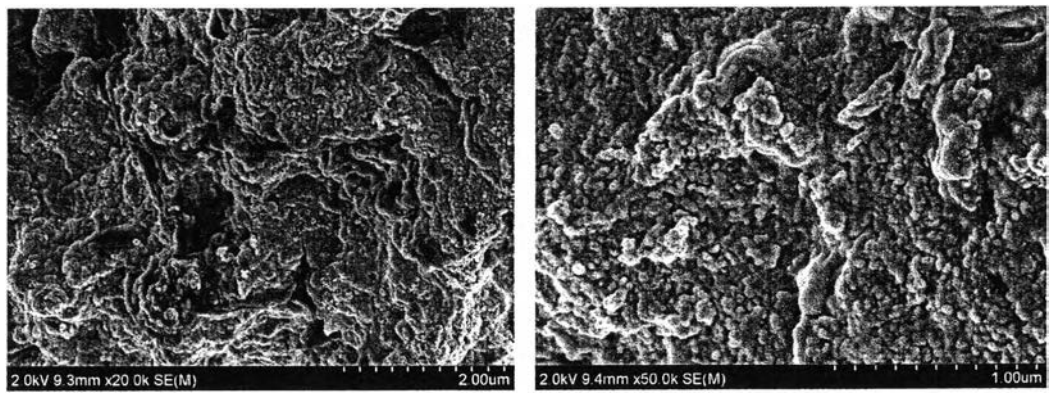

Figure C3 SEM image of Ni/Al_2O_3 (Spent).

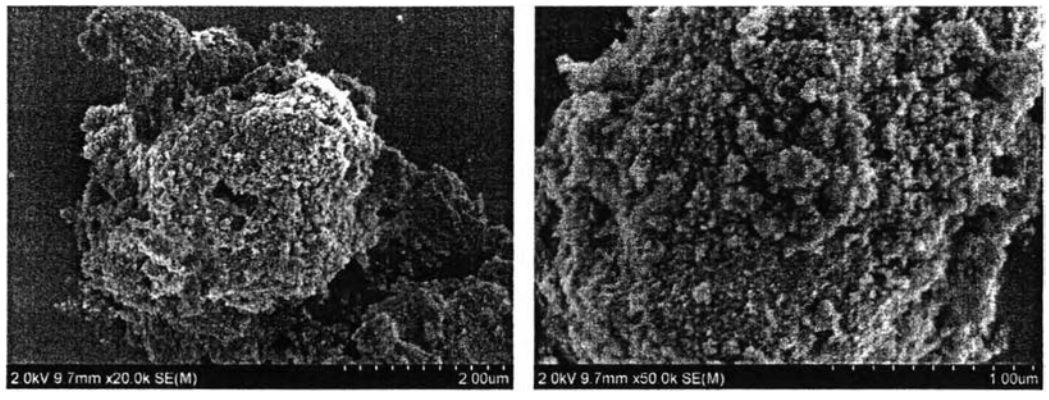

Figure C4 SEM image of Ni-Co/Al_2O_3 (Fresh).

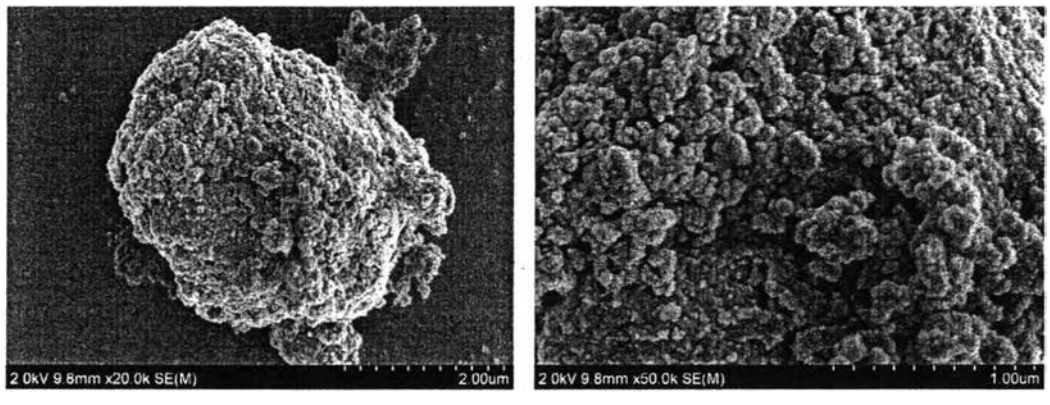

Figure C5 SEM image of NiMo/Al_2O_3 (Fresh).

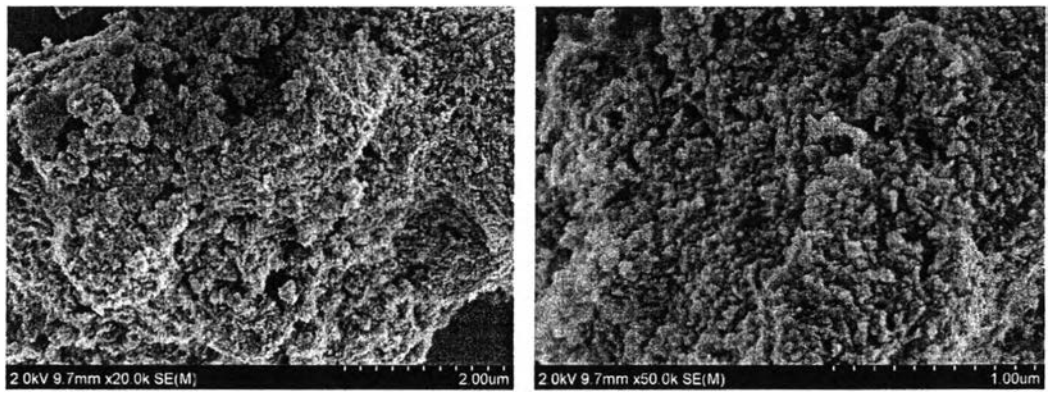

Figure C6 SEM image of NiMo/Al_2O_3 (Spent).

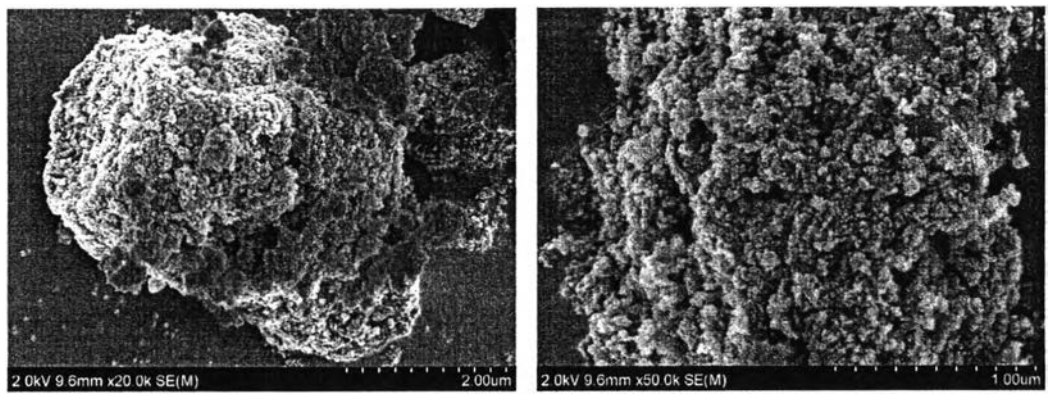

Figure C7 SEM image of Cu/Al_2O_3 (Fresh).

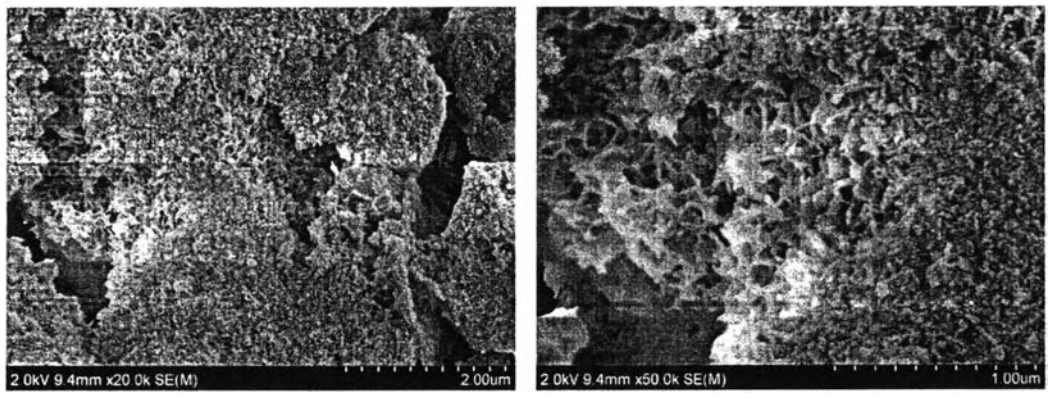

Figure C8 SEM image of Cu/Al_2O_3 (Spent).

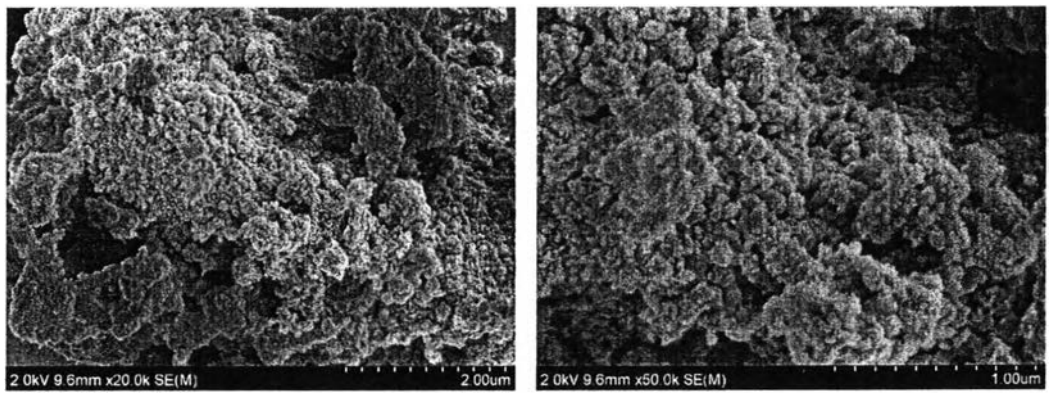

Figure C9 SEM image of $CuMo/Al_2O_3$ (Fresh).

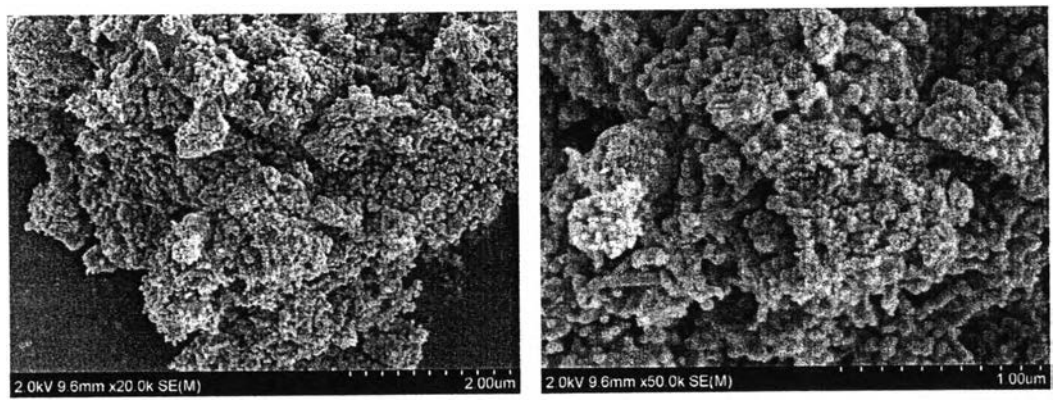

Figure C10 SEM image of $CuMo/Al_2O_3$ (Spent).

Appendix D Electronic Properties of Active Metals

Metal	atomic radius	Bonding radius	Ground state	Eletrone - gativity	Density	First outer shell	Second outer shell	Third outer shell	Ground state	Oxidation state	1st Ionization (ev)	Crystal
Mo	1.39	1.3	$_7S^3$	2.16	10.2	13	1		$4d^5\ 5s$	6,3	7.0924	bcc
W	1.41	1.3	$_5D^0$	2.36	19.35	32	12	2	$4f^{14}\ 5d^4\ 6s^2$	6	7.864	bcc
Cu	1.28	1.17	$_2S^{0.5}$	1.9	8.92	18	1		$3d^{10}\ 4s$	2,1	7.7264	ccp
Ni	1.24	1.15	$_3F^4$	1.91	8.9	16	2		$3d^8\ 4s^2$	2,3	7.6398	ccp
Pd	1.37	1.28	$_1S^0$	2.2	12.02	18	0		$4d^{10}$	2,4	8.3369	fcc
Pt	1.39	1.3	$_3D^3$	2.28	21.45	32	17	1	$4f^{14}\ 5d^9\ 6s$	4,2	8.9588	fcc
Co	1.25	1.16	$_4F^{4.5}$	1.88	8.9	15	2		$3d^7\ 4s^2$	2,3	7.881	hcp
Rh	1.34	1.25	$_4F^{4.5}$	2.28	12.4	16	1		$4d^8\ 5s$	3,4	7.4589	fcc
IR	1.36	1.27	$_4F^{4.5}$	2.2	22.421	32	15	2	$4f^{14}\ 5d^7\ 6s^2$	3,4	8.967	fcc
Ru	1.34	1.25	$_5F^5$	2.2	12.3	15	1		$4d^7\ 5s$	3,4,8	7.3605	hcp
Zn	1.38	1.25	$_1S^0$	1.65	7.14	18	2		$3d^{10}\ 4s^2$	2	9.3942	hcp

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Proceedings:

1. Parawan, T., Jongpatiwut, S., Sreethawong, T., Butnark, S., and Osuwan, S. (2011, January 5-7) Deoxygenation of Animal Fats for the Production of Hydrogenated Biodiesel: Effect of Active Metals. Proceedings of Pure and Applied Chemistry International Conference 2011, Bangkok, Thailand
2. Parawan, T., Jongpatiwut, S., Sreethawong, T., Butnark, S., and Osuwan, S. (2011, April 26) Deoxygenation of Beef Fat for the Production of Hydrogenated Biodiesel: Effect of Active Metals. Proceedings of The 2nd Research Symposium on Petroleum, Petrochemicals, and Advanced Materials and the 17th PPC Symposium on Petroleum, Petrochemicals, and Polymers, Bangkok, Thailand.