SINTESIS, KARAKTERISASI DAN KINERJA KATALIS $Mg_{1-x}Cu_xF_{0,66}(OH)_{1,34}$ PADA REAKSI TRIMETILHIDROKUINON DAN ISOFITOL

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LATAR BELAKANG

KATALIS

Katalis Homogen

H_2SO_4, HCl, H_3PO_4, HNO_3
(Khayoon dan Hameed, 2011)

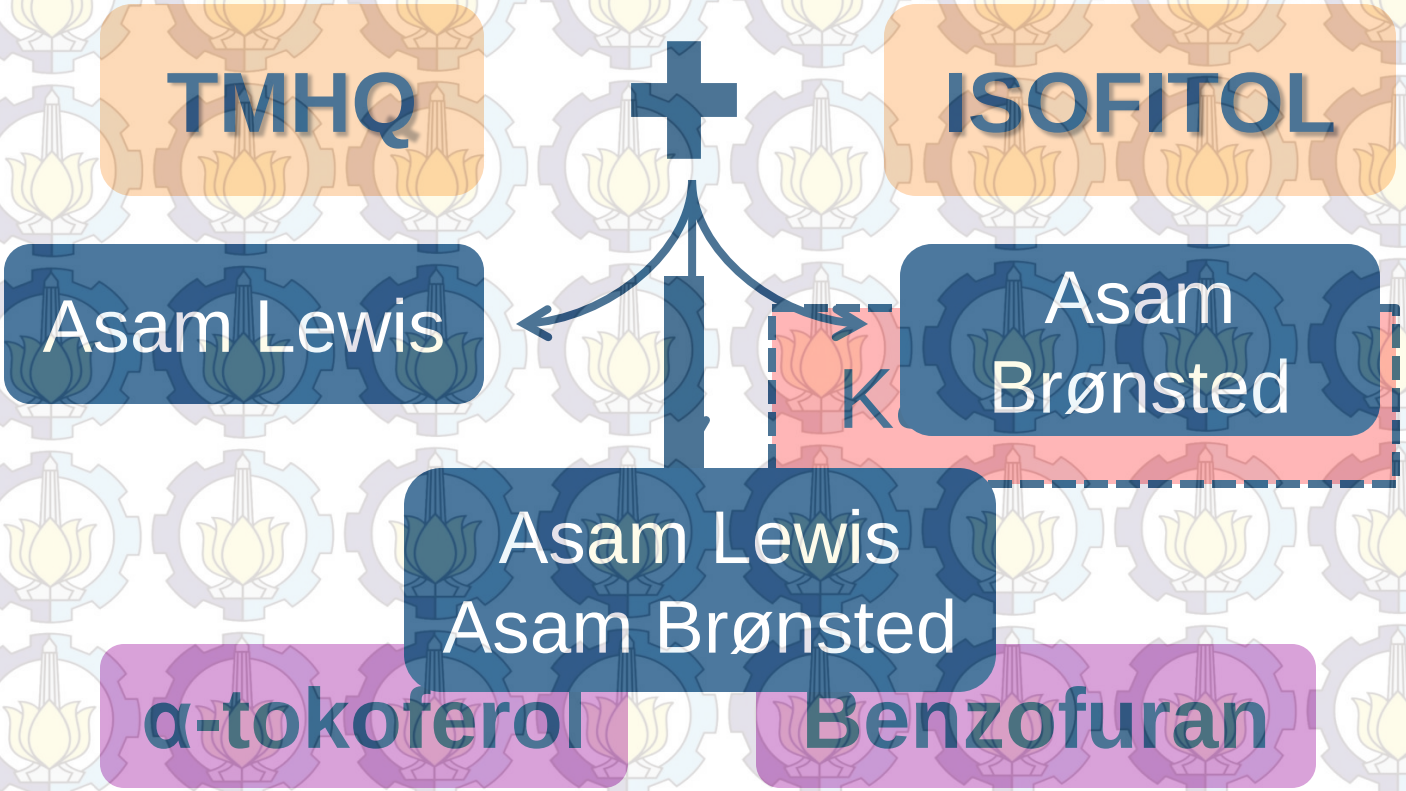
- Bersifat korosif
- Sulit digunakan kembali
- Proses pemisahan sulit dilakukan
(Zhou dkk., 2012)

Katalis Heterogen

Zeolit, ZSM-5, Amberlyst, Nafion, MOF, MgF_2

- Tidak korosif
- Dapat digunakan kembali
- Proses pemisahan dapat dilakukan

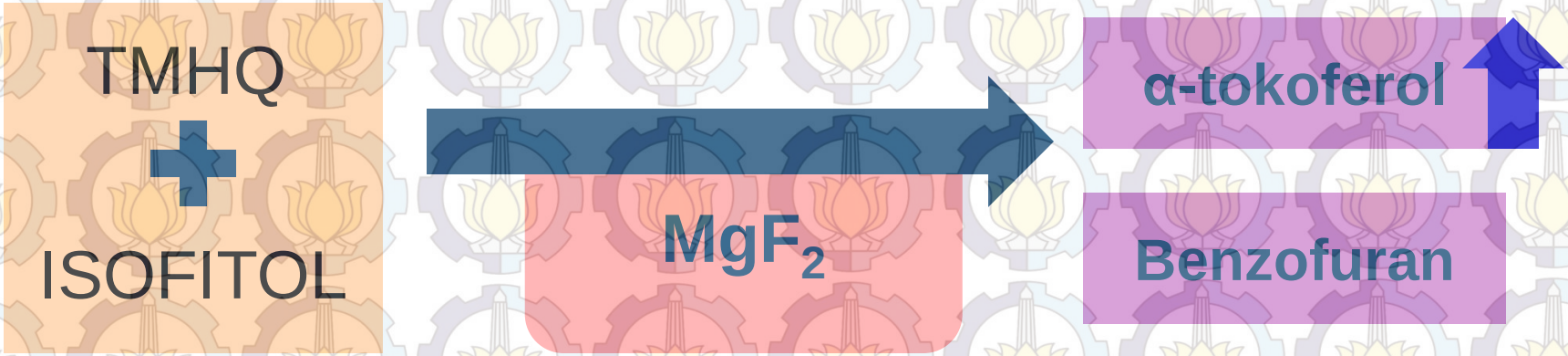
Bonrath dan Netscher, 2005



Antioksidan
(Fithriyah, 2013)

Sensor *Fluorescent*
(Liu dkk., 2012)

Wuttke, 2008



MgF_2

Keasaman Lewis <<

Modifikasi

Keasaman Brønsted

\+ OH

Keasaman Lewis

\+ Doping Cu

$Mg_{1-x}Cu_xF_{0,66}(OH)_{1,34}$

x = 0; 0,025; 0,05; 0,075; 0,1; 0,15

Kinerja Katalis ?

TUJUAN

x = 0; 0,025; 0,05; 0,075; 0,1; 0,15

$MgF_{0,66}(OH)_{1,34}$ + Cu → $Mg_{1-x}Cu_xF_{0,66}(OH)_{1,34}$

- Keasaman ↑
- Aktivitas (konversi TMHQ) ↑
- Selektivitas (produk) ↑

MANFAAT

Informasi mengenai katalis heterogen yang sesuai untuk reaksi TMHQ dan Isofitol

METODOLOGI PENELITIAN

Sintesis Katalis $Mg_{1-x}Cu_xF_{0,66}(OH)_{1,34}$

Karakterisasi

XRD
FTIR
Adsorpsi Piridin-FTIR
Adsorpsi Gas N_2

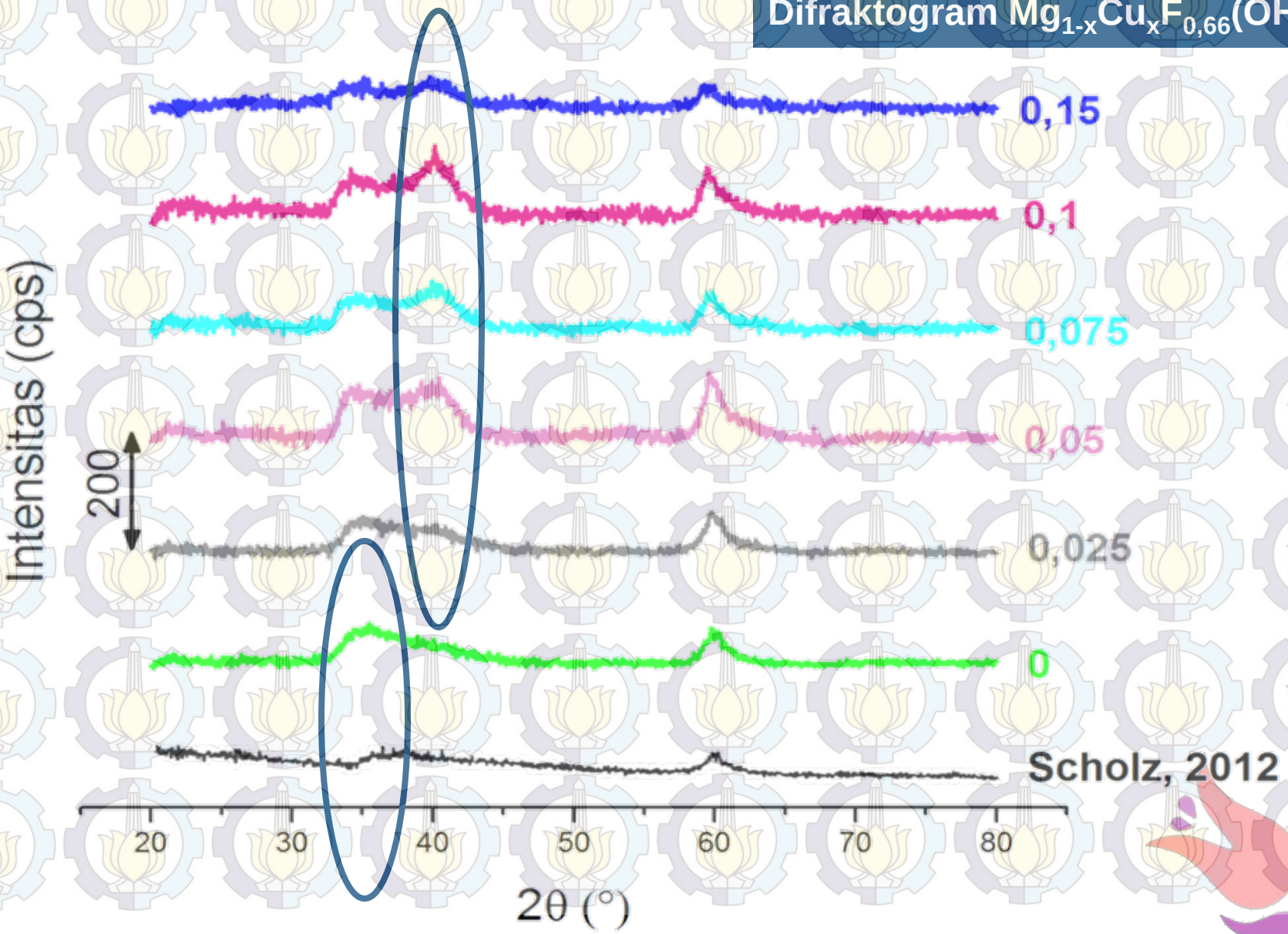
Uji Katalisis

Reaksi TMHQ dan Isofitol :
Analisis UV-Vis

x = 0; 0,025; 0,05; 0,075; 0,1; dan 0,15

HASIL DAN PEMBAHASAN

Difraktogram $Mg_{1-x}Cu_xF_{0,66}(OH)_{1,34}$

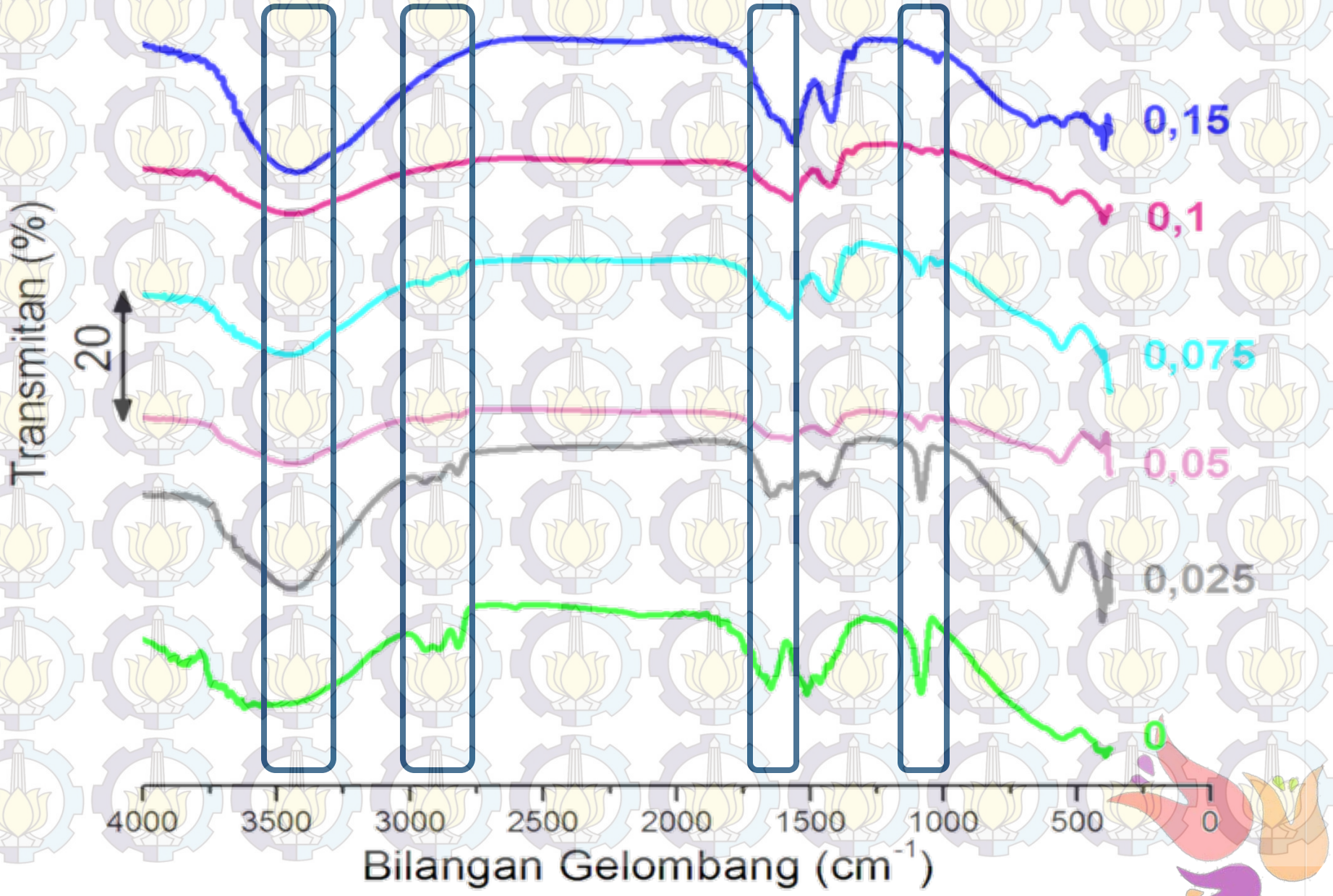


Nilai Pergeseran 2θ Katalis $Mg_{1-x}Cu_xF_{0,66}(OH)_{1,34}$

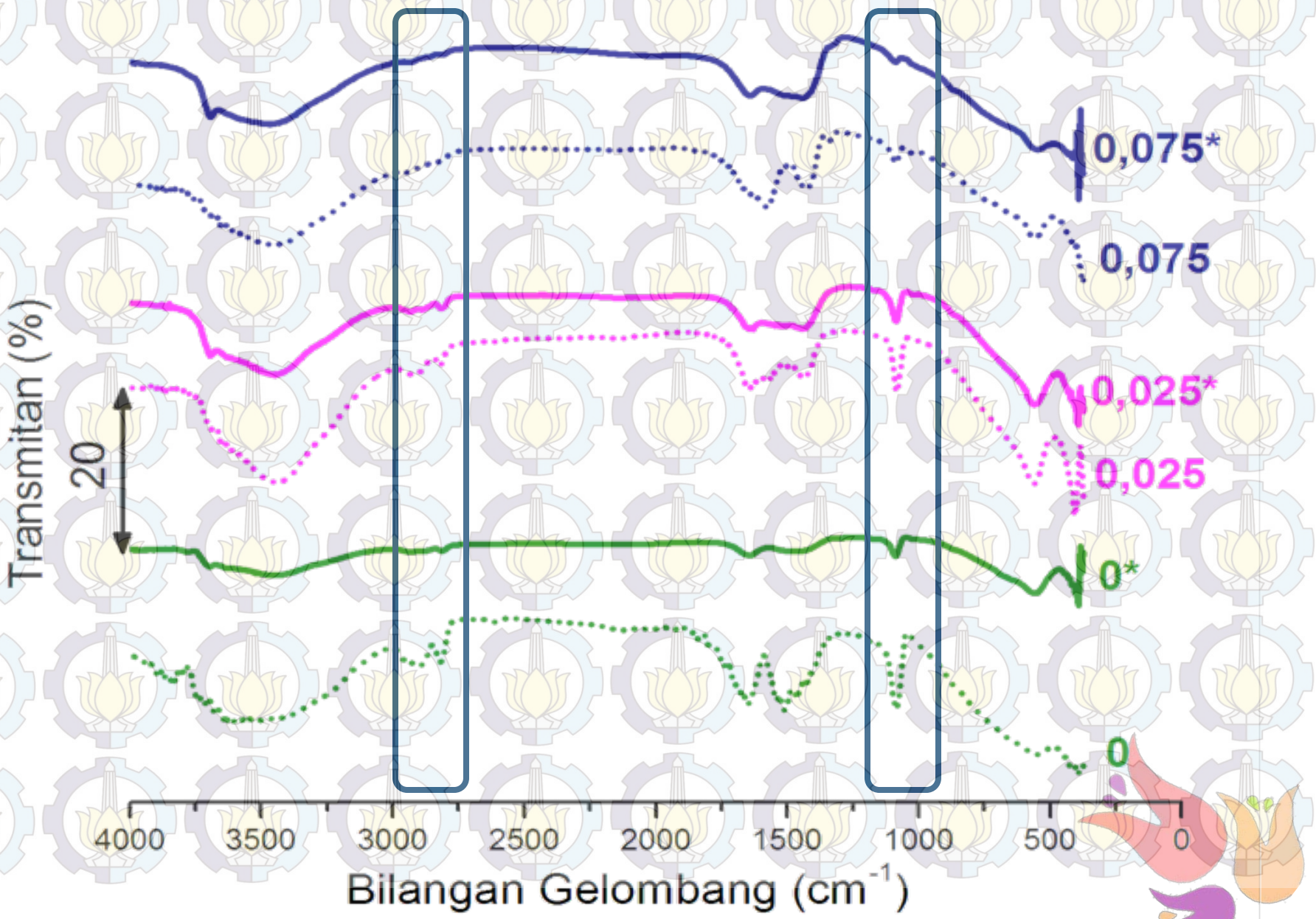
Nilai x pada katalis $Mg_{1-x}Cu_xF_{0,66}(OH)_{1,34}$	2θ (°)		
0	35,15	-	59,90
0,025		37	59,90
0,05		09	59,62
0,075		09	59,62
0,1	34,31	40,37	59,34
0,15	35,15	40,09	59,34

Pergeseran 2θ : indikasi doping Cu telah terjadi

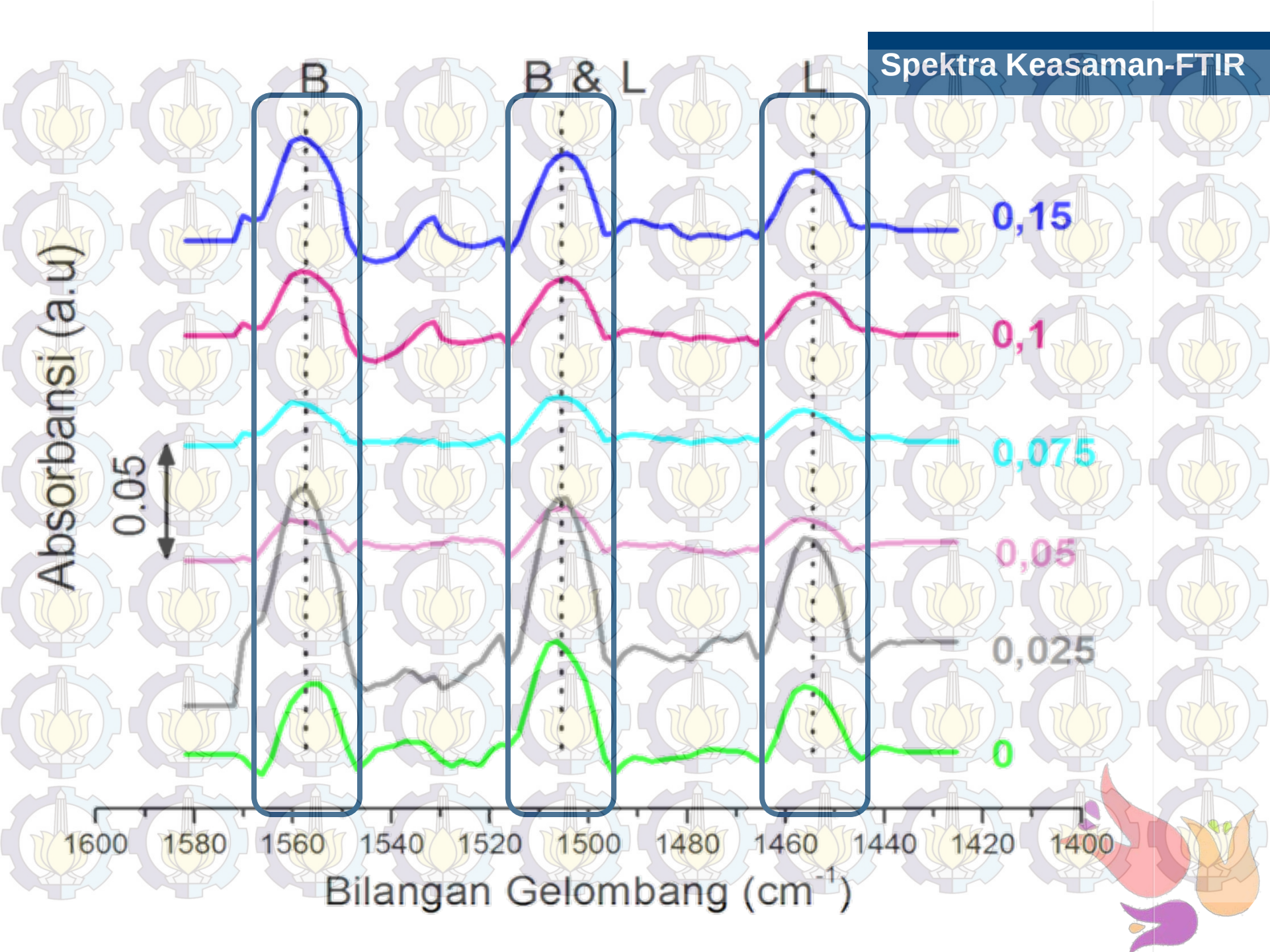
Spektra FTIR Xerogel $Mg_{1-x}Cu_xF_{0,66}(OH)_{1,34}$



Perbandingan Spektra FTIR Setelah Kalsinasi



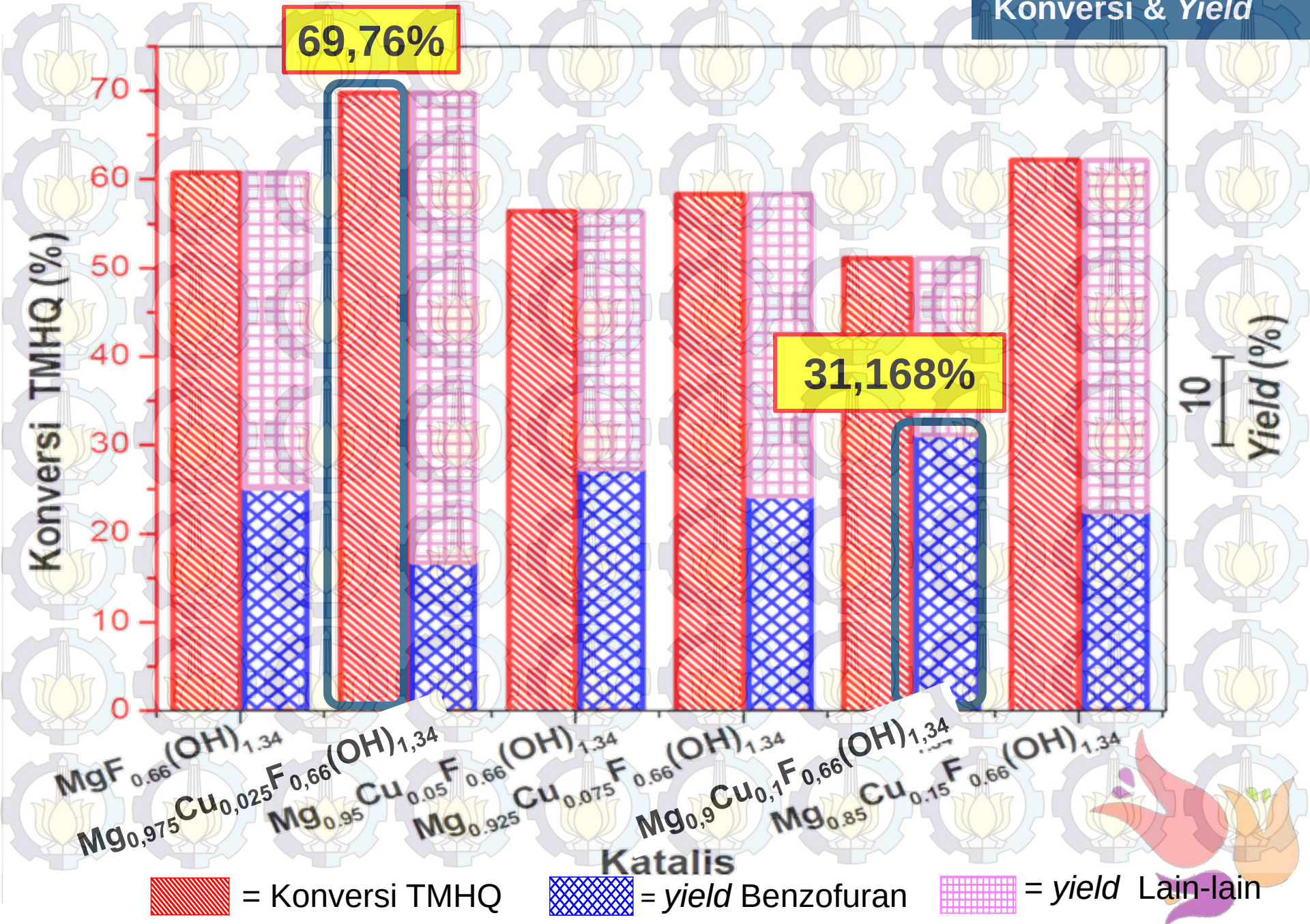
Spektra Keasaman-FTIR



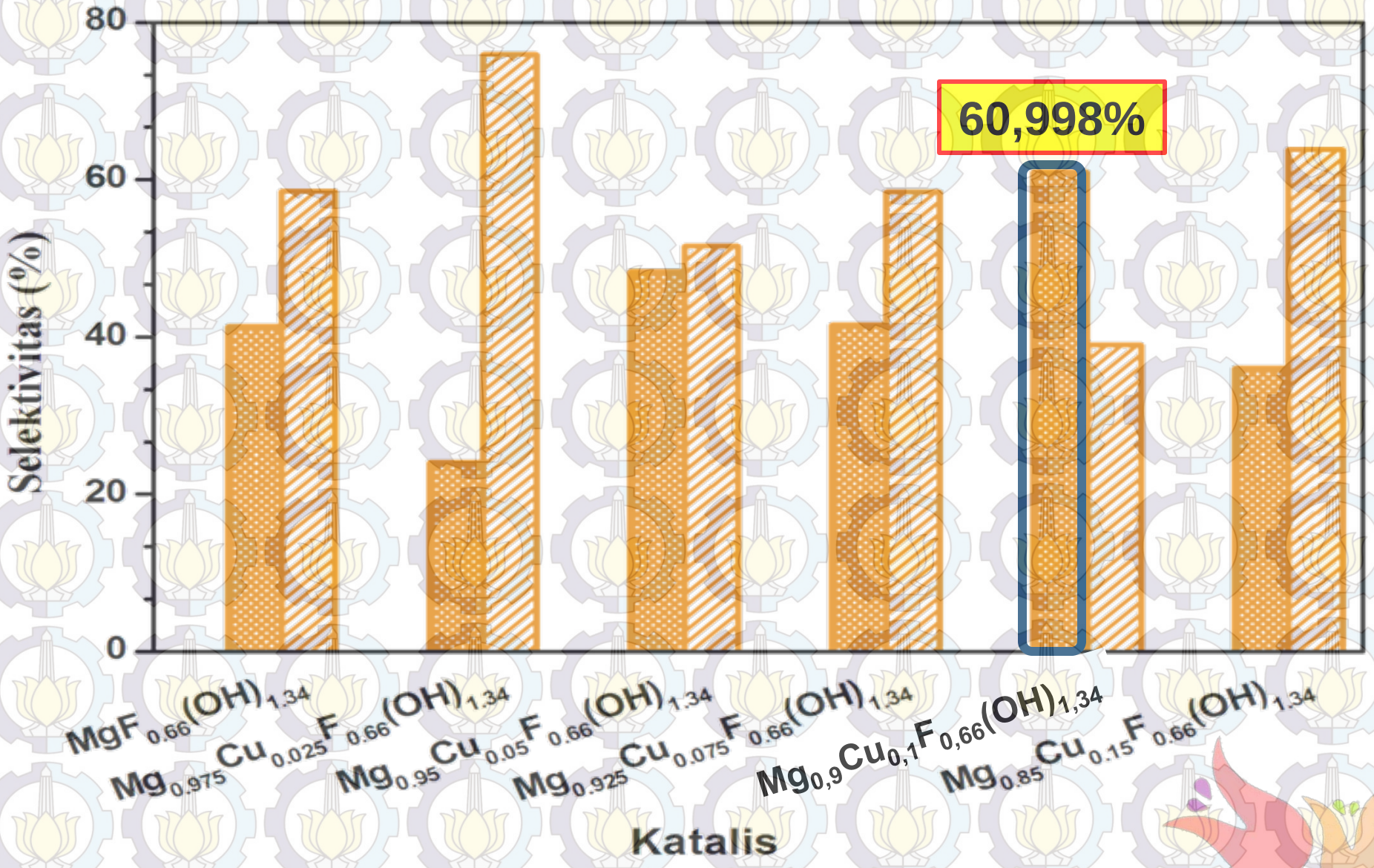
Luas Permukaan Katalis

Katalis	Luas Permukaan (m^2/g)
$MgF_{0,66}(OH)_{1,34}$	26,884
$Mg_{0,975}Cu_{0,025}F_{0,66}(OH)_{1,34}$	171,741
$Mg_{0,95}Cu_{0,05}F_{0,66}(OH)_{1,34}$	256,239
$Mg_{0,925}Cu_{0,075}F_{0,66}(OH)_{1,34}$	312,064
$Mg_{0,9}Cu_{0,1}F_{0,66}(OH)_{1,34}$	362,011
$Mg_{0,85}Cu_{0,15}F_{0,66}(OH)_{1,34}$	306,272

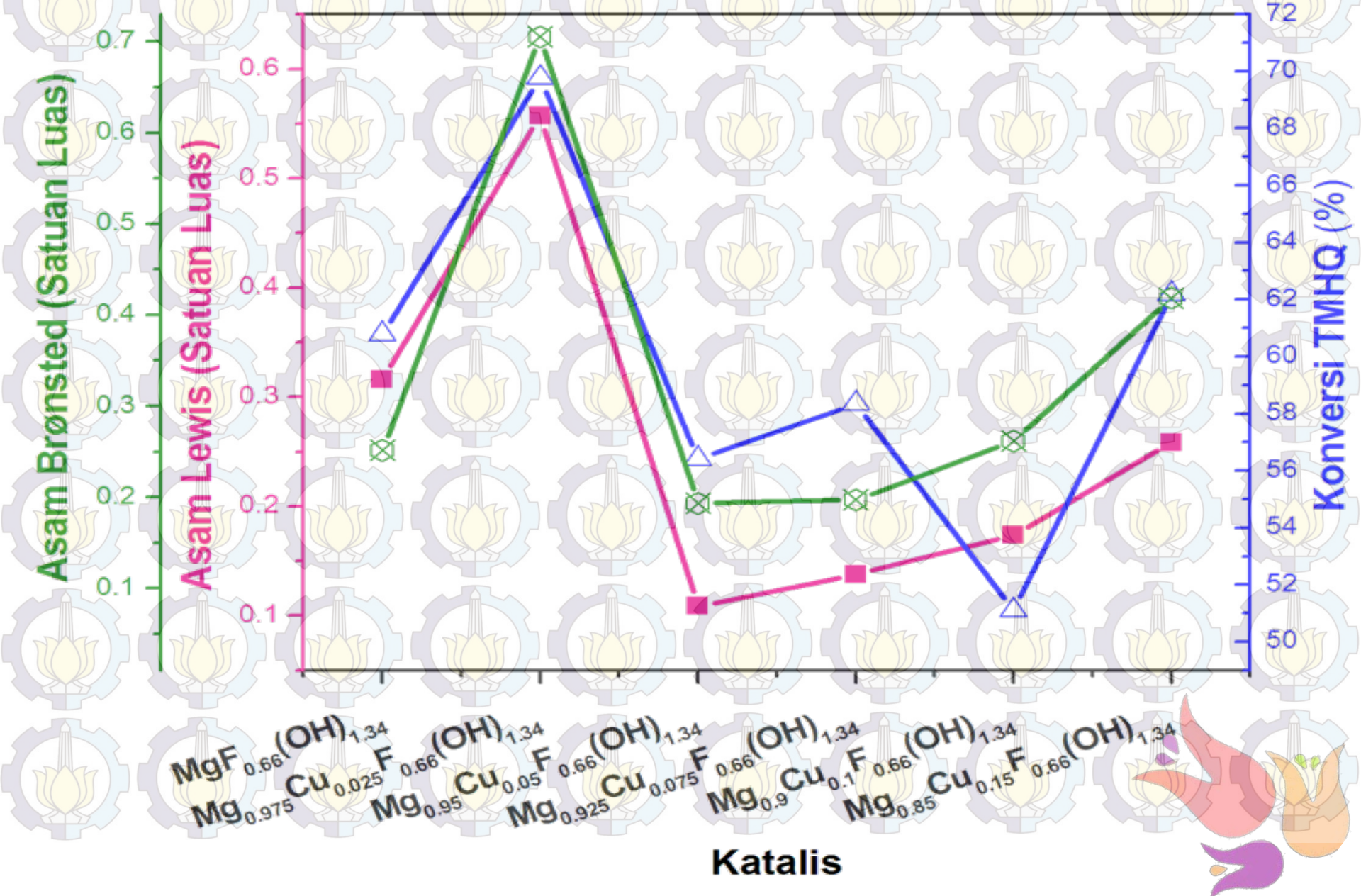
Konversi & *Yield*



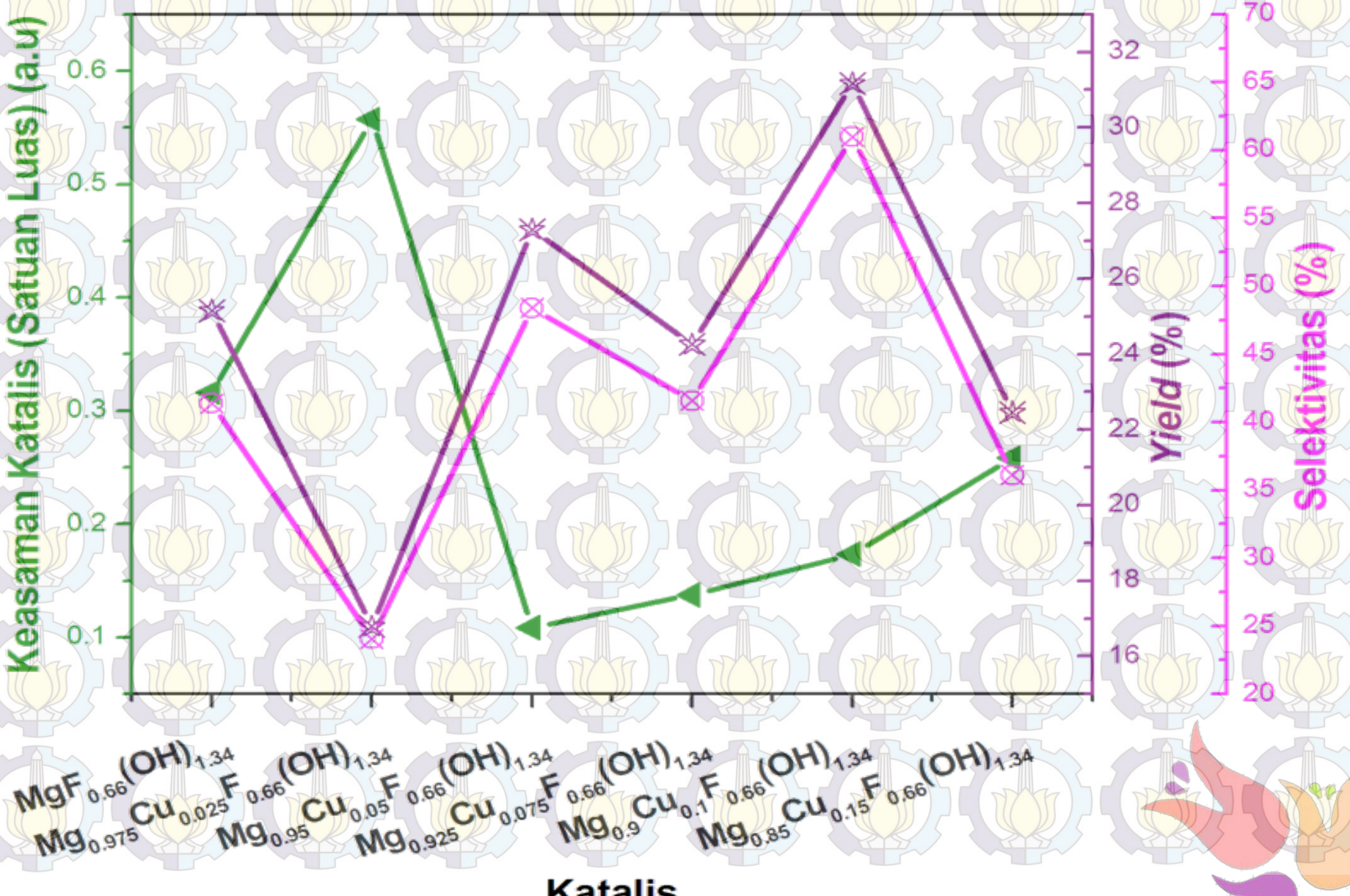
Selektivitas Produk Reaksi



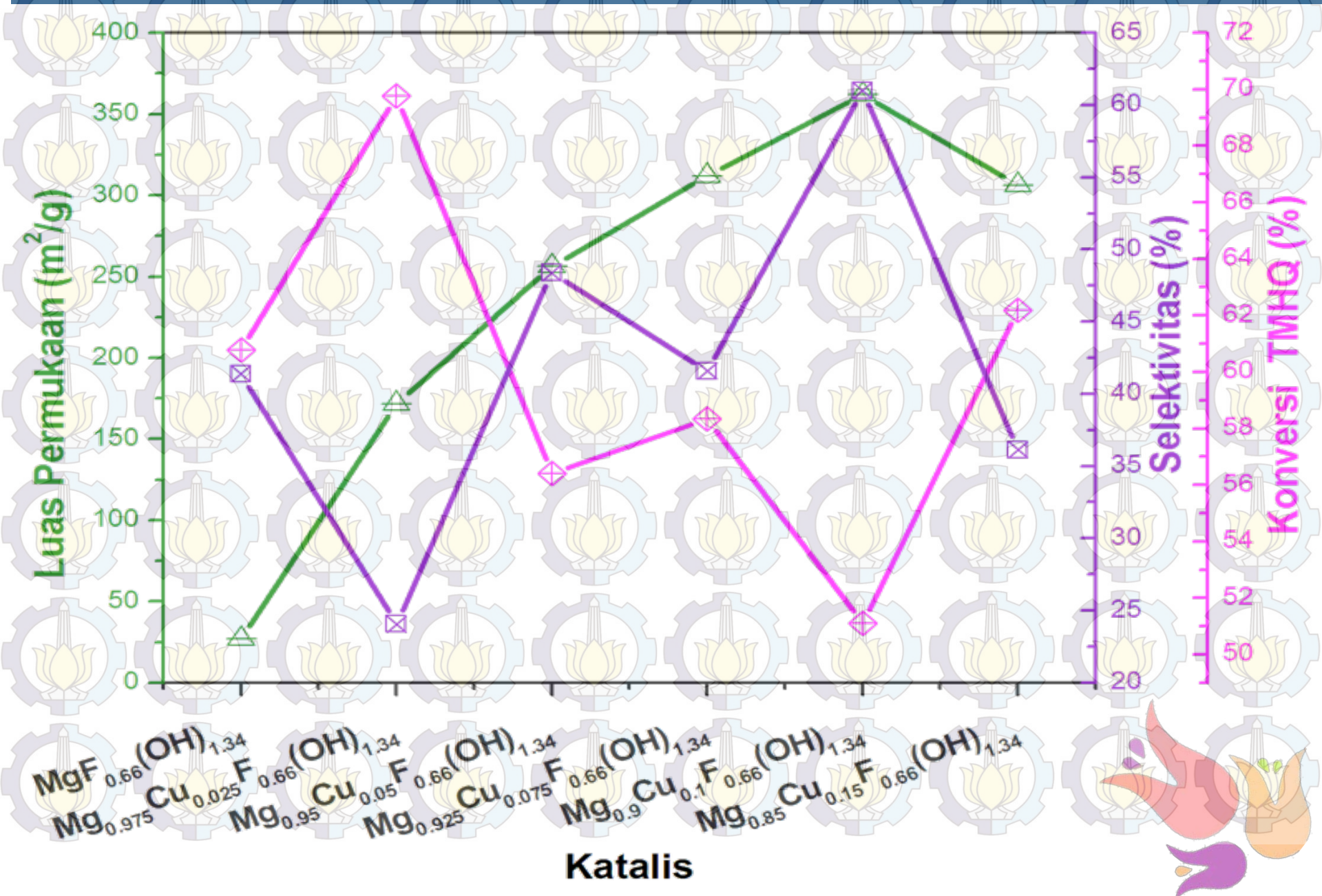
Korelasi antara Keasaman pada Katalis dengan Konversi TMHQ



Korelasi antara Keasaman pada Katalis dengan Yield dan Selektivitas



Korelasi antara Luas Permukaan Katalis dengan Selektivitas dan Konversi TMHQ



KESIMPULAN

$Mg_{1-x}Cu_xF_{0,66}(OH)_{1,34}$

x= 0	x= 0,025	x= 0,05	x= 0,075	x= 0,1	x= 0,15

Konversi

69,76 %

KESIMPULAN

$Mg_{1-x}Cu_xF_{0,66}(OH)_{1,34}$

x= 0	x= 0,025	x= 0,05	x= 0,075	x= 0,1	x= 0,15

	Konversi	*Yield*	Selektivitas
Benzofuran		31,168 %	60,998 %

- Keasaman Lewis ✓
- Keasaman Brønsted ✓
- Luas Permuka[illegible] ✗

TERIMAKASIH

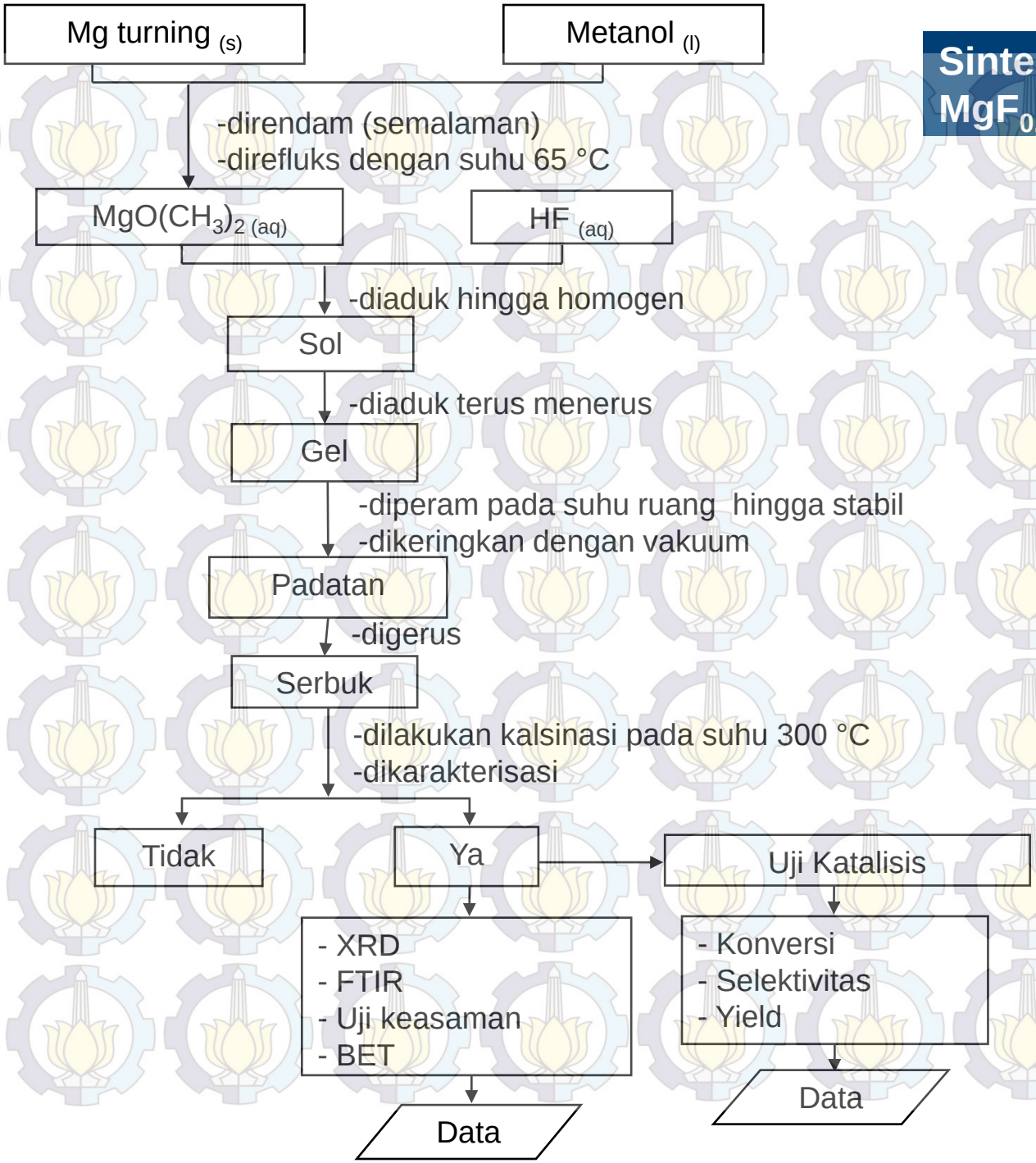
-Prof. Dr. rer. nat. Irmina Kris Murwani

-Dosen - dosen penguji

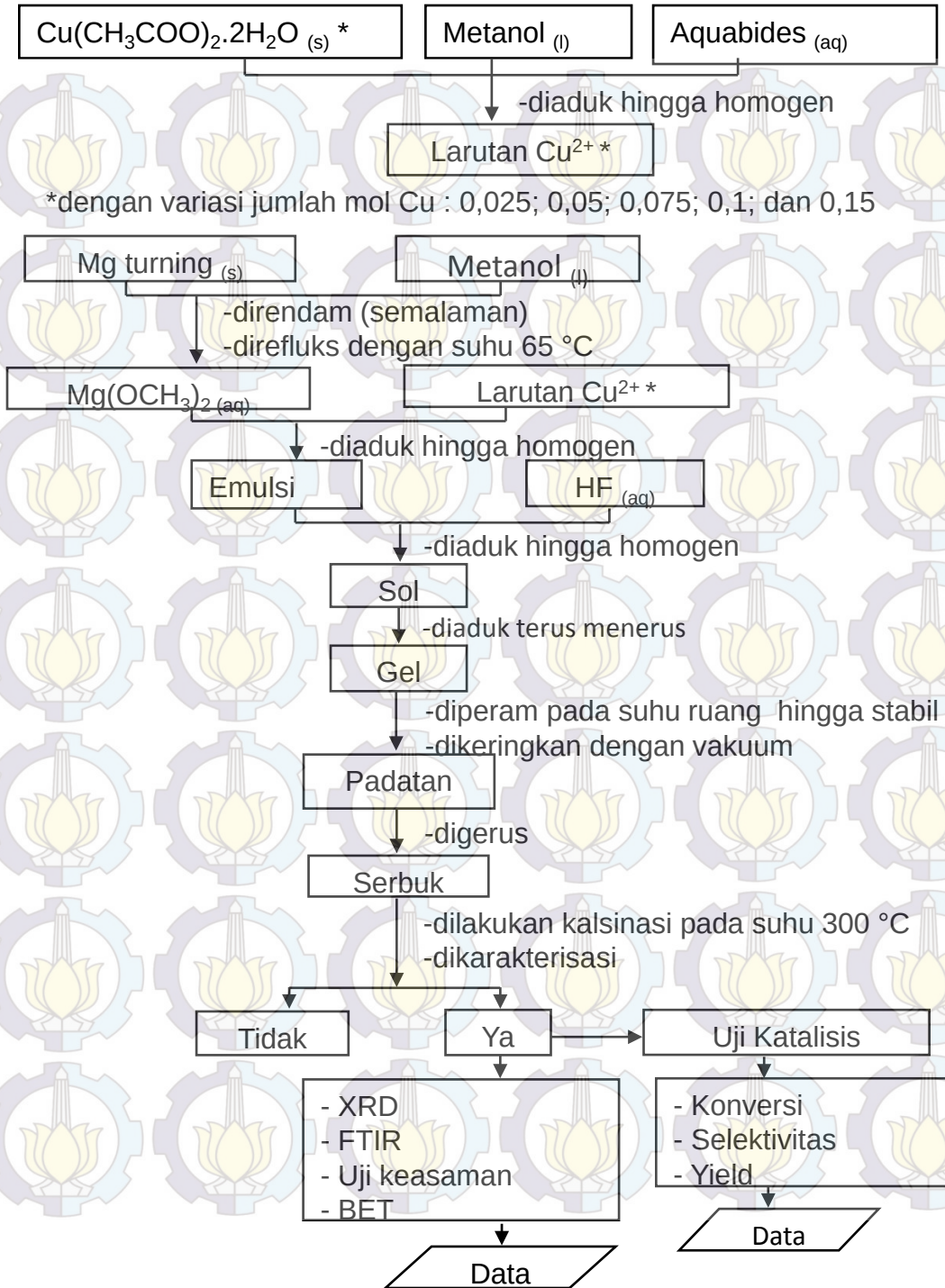
-Teman-teman tim penelitian katalis

-Semua pihak yang membantu dalam penyusunan Skripsi ini.

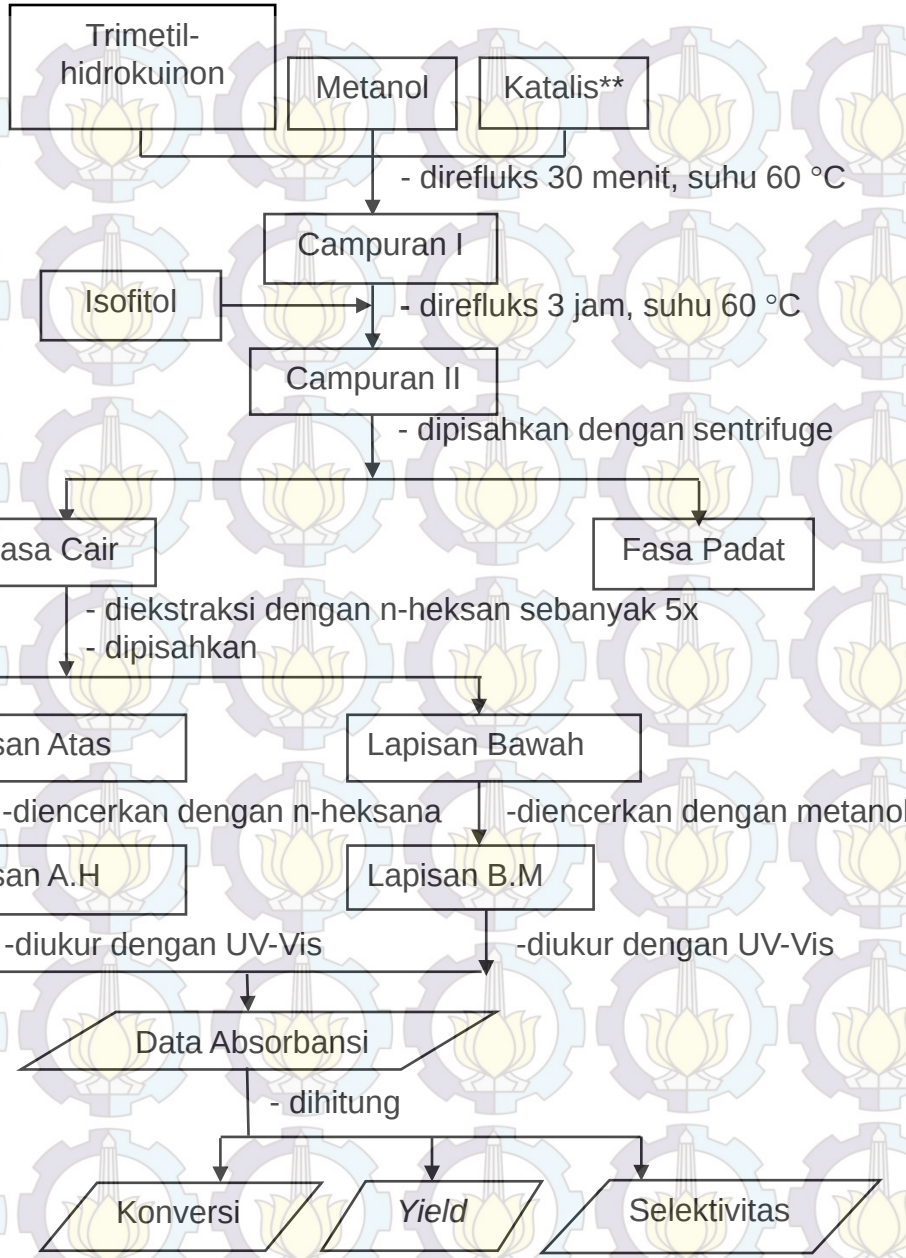
Sintesis Katalis Katalis $MgF_{0,66}(OH)_{1,34}$



Sintesis Katalis Katalis $Mg_{1-x}Cu_xF_{0,66}(OH)_{1,34}$



Uji Katalisis pada Reaksi TMHQ dan Isofitol



Geometri kristal

CUBIC
$a = b = c$
$\alpha = \beta = \gamma = 90°$

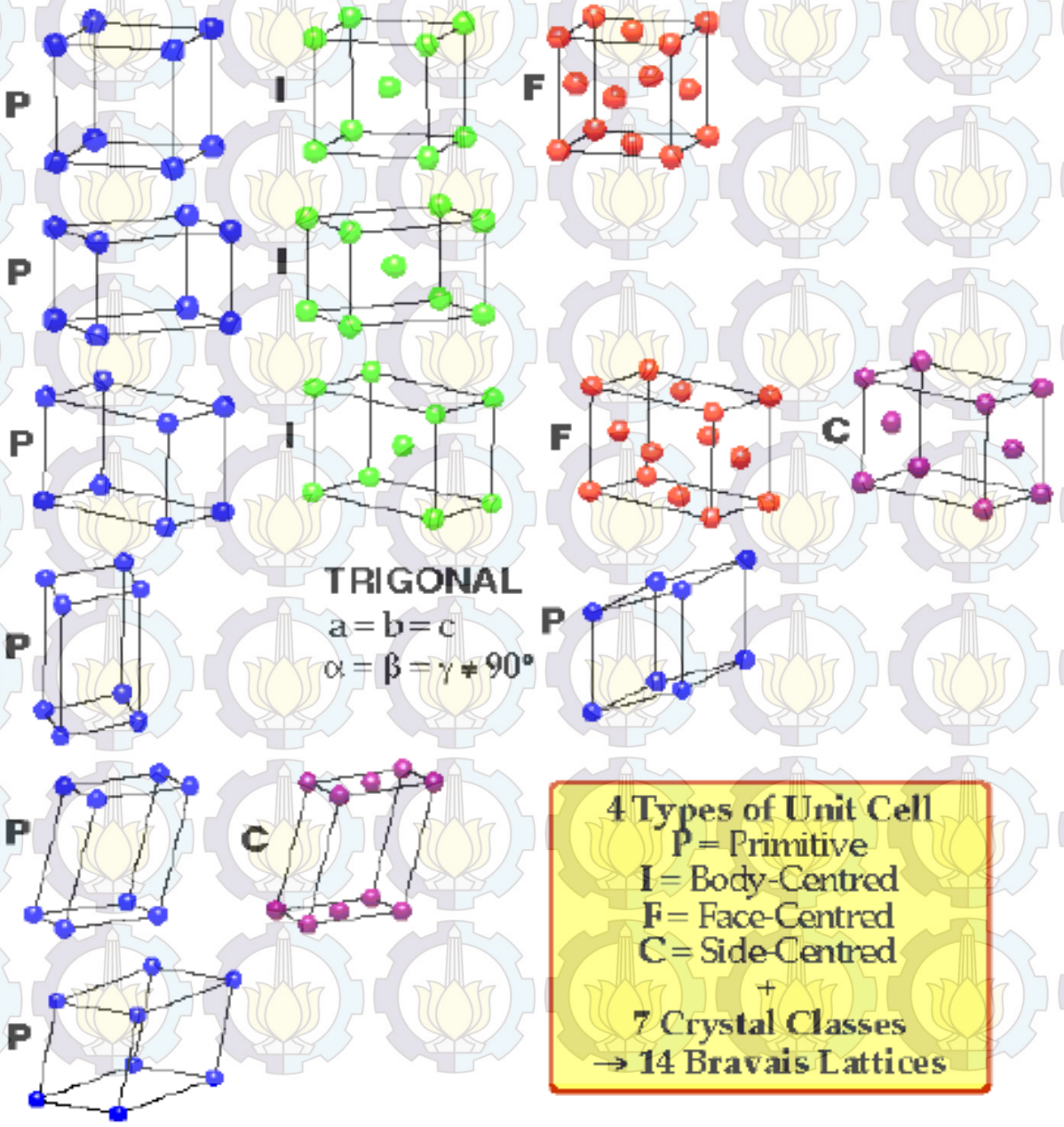
TETRAGONAL
$a = b \neq c$
$\alpha = \beta = \gamma = 90°$

ORTHORHOMBIC
$a \neq b \neq c$
$\alpha = \beta = \gamma = 90°$

HEXAGONAL
$a = b \neq c$
$\alpha = \beta = 90°$
$\gamma = 120°$

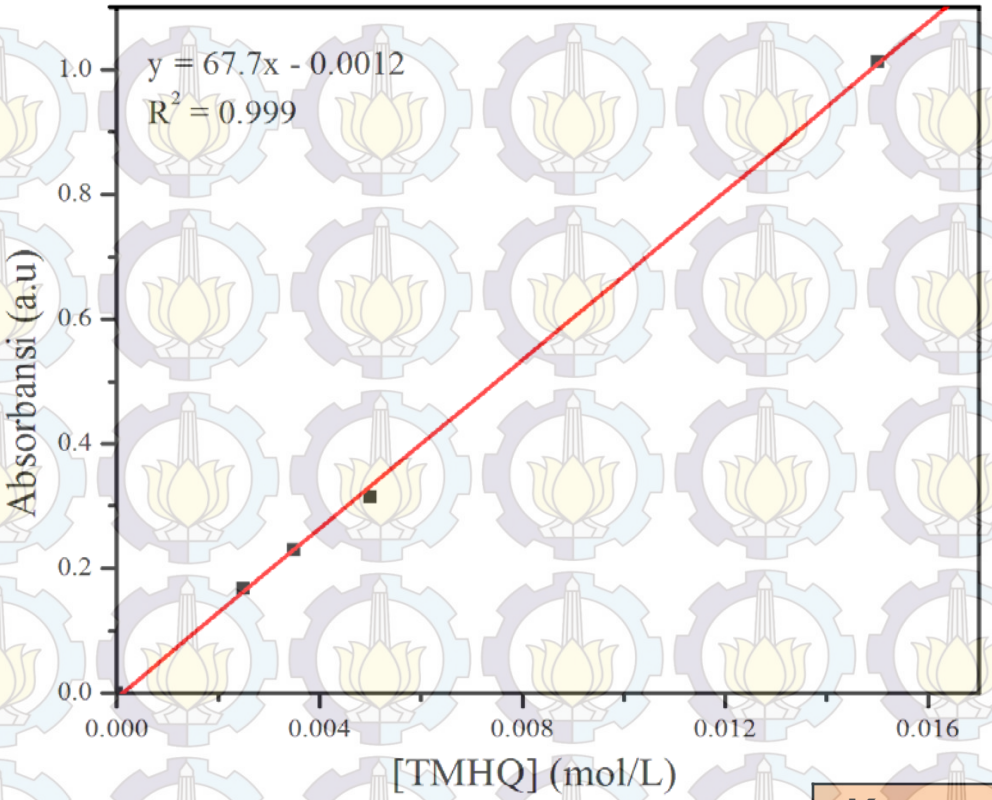
MONOCLINIC
$a \neq b \neq c$
$\alpha = \gamma = 90°$
$\beta \neq 120°$

TRICLINIC
$a \neq b \neq c$
$\alpha \neq \beta \neq \gamma \neq 90°$

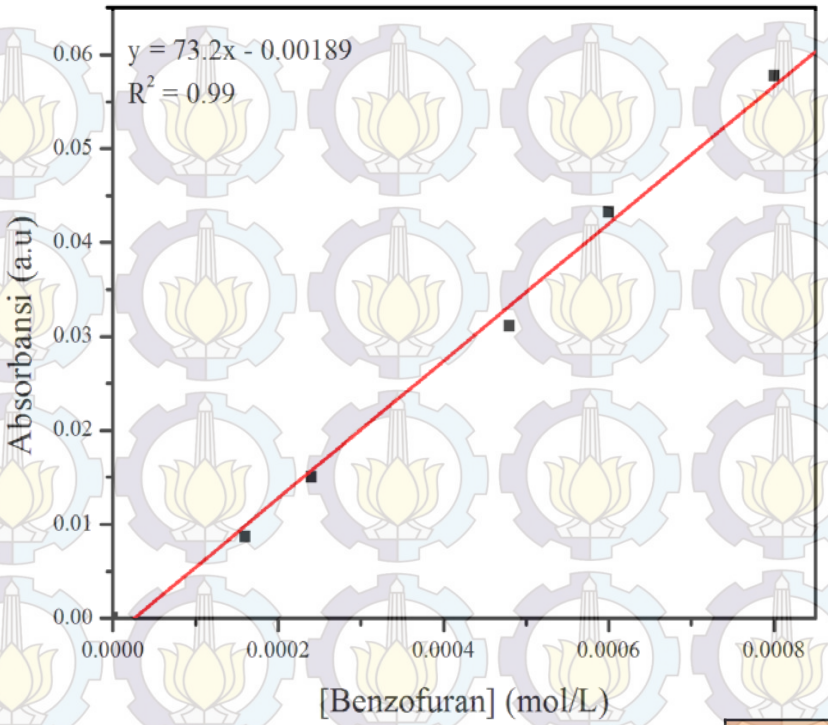


4 Types of Unit Cell
P = Primitive
I = Body-Centred
F = Face-Centred
C = Side-Centred
+
7 Crystal Classes
→ 14 Bravais Lattices

	Mixed powders	*Coprecipitation*	*Sol–gel*	*Hydrothermal*	*Spray and freeze drying*
State of development	Commercial	Commercial	Commercial; research and development	Demonstration	Demonstration
Size of particle (nm)	>1000	>10	>10	>100	>10
Homogeneity	Poor	Good	Very good	Very good	Very good
Purity	Poor	Very good	Excellent	Very good	Excellent
Temperature of calcination (°C)	>1000	500–1000	500–1000	80–374	>150
Agglomeration	Moderate	High	Moderate	Low	Low
Costs	Low to moderate	Moderate	Moderate to high	Moderate	Moderate to high



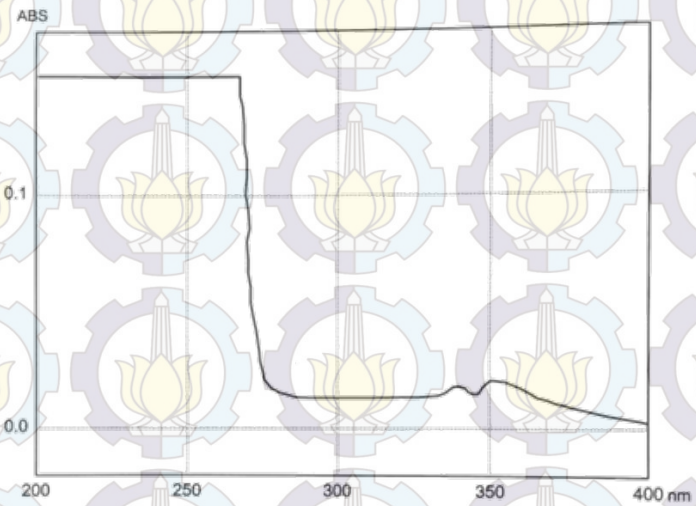
Konsentrasi (mol/L)	Absorbansi (a.u)
0	0
0,0025	0,168
0,0035	0,23
0,005	0,315
0,015	1,013



Konsentrasi (mol/L)	Absorbansi (a.u)
0	0
0,00016	0,00871
0,00024	0,015
0,00048	0,03114
0,0006	0,0432
0,0008	0,05776

UV1100 Spectrophotometer

Serial NUM: 5210027
ROM Version: 20
Sample Name:
Date:
Operator:



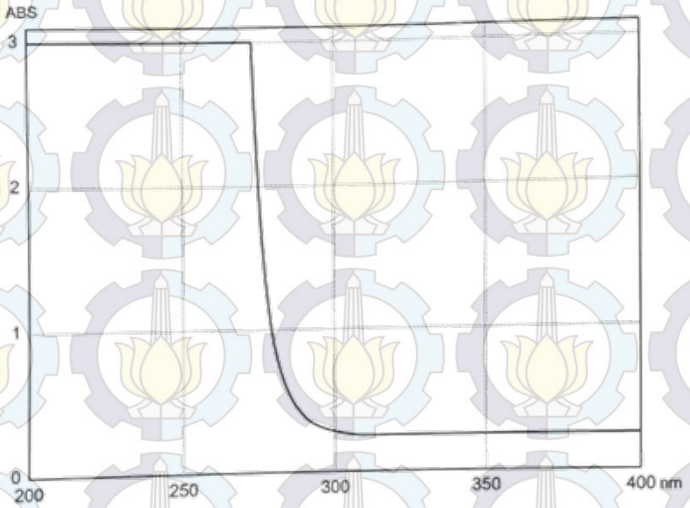
Wavelength Scan

Data Mode:	ABS
Scan Range:	400.0-200.0nm
Slit Width:	4nm
Speed (nm/min) :	200nm/min
Lamp Change Wavelength:	340.0nm
Path Length:	

Peak WL (nm)	ABS	WL (nm)	ABS
338.0	0.0165	352.8	0.0253

UV1100 Spectrophotometer

Serial NUM: 5210027
ROM Version: 20
Sample Name:
Date:
Operator:

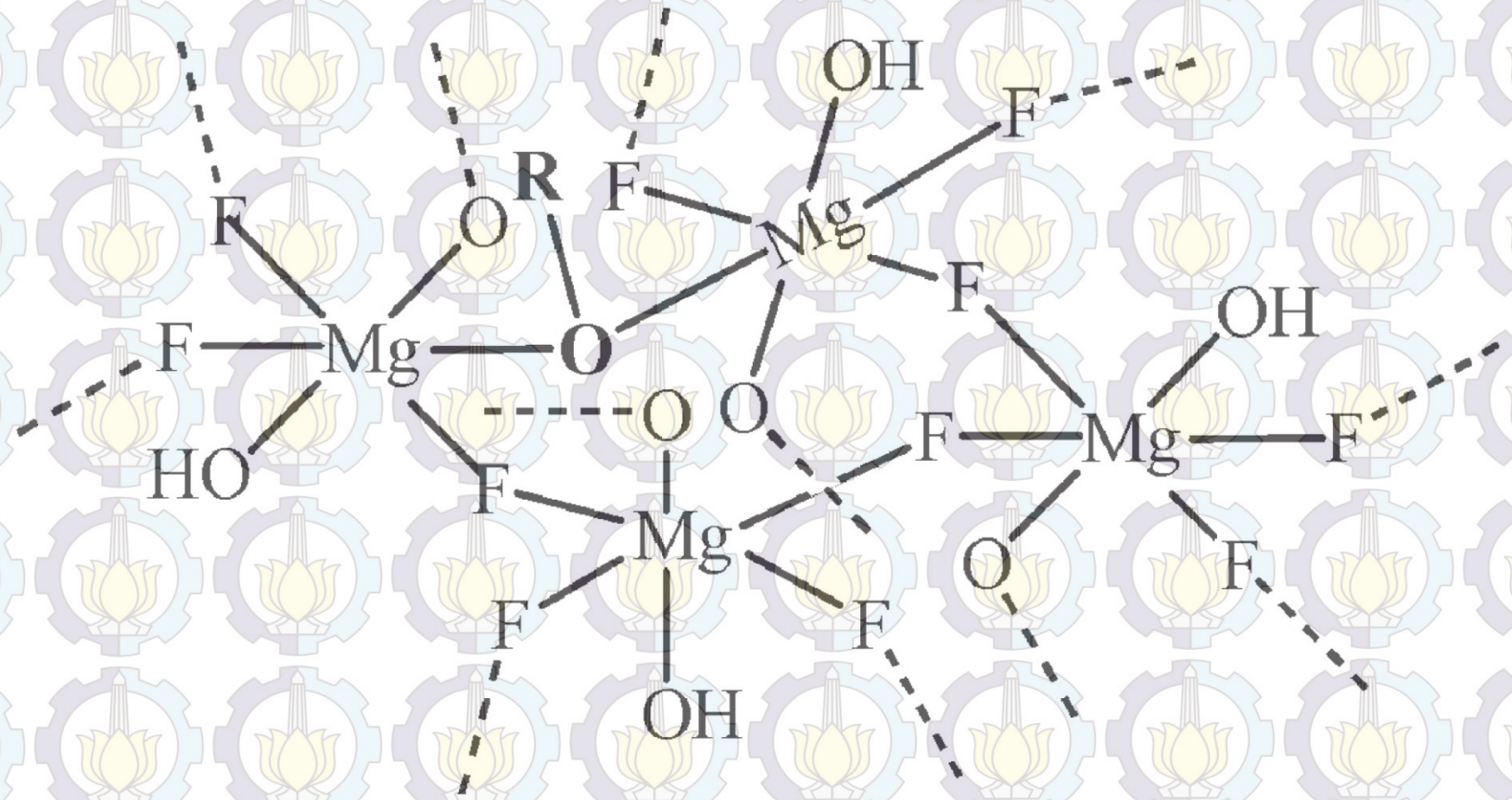


Wavelength Scan

Data Mode:	ABS
Scan Range:	400.0-200.0nm
Slit Width:	4nm
Speed (nm/min) :	200nm/min
Lamp Change Wavelength:	340.0nm
Path Length:	

Peak WL (nm)	ABS	WL (nm)	ABS

Katalis	Absorbansi	
	TMHQ	Benzofuran
$MgF_{0,66}(OH)_{1,34}$	0.025	0.0165
$Mg_{0,975}Cu_{0,025}F_{0,66}(OH)_{1,34}$	0.019	0.0104
$Mg_{0,95}Cu_{0,05}F_{0,66}(OH)_{1,34}$	0.028	0.0181
$Mg_{0,925}Cu_{0,075}F_{0,66}(OH)_{1,34}$	0.027	0.0158
$Mg_{0,9}Cu_{0,1}F_{0,66}(OH)_{1,34}$	0.032	0.0209
$Mg_{0,85}Cu_{0,15}F_{0,66}(OH)_{1,34}$	0.024	0.0146


OH
F
R
F
O
F
Mg
F
F
Mg
O
OH
HO
O
O
F
Mg
F
F
Mg
O
F
F
F
OH

Spektra FTIR $Mg(OCH)_3$