

(19)  
(12)

(KR)  
(A)

(51) 。 Int. Cl. <sup>7</sup>  
C08F 4/642

(11)  
(43)

2002 - 0081232  
2002 10 26

(21)	10 - 2002 - 7008189
(22)	2002 06 22
	2002 06 22
(86)	PCT/EP2000/12641
(86)	2000 12 13

(87)	WO 2001/47635
(87)	2001 07 05

(81)

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AP ARIPO : , 가 ,

EA :

EP :

OA OAPI : , 가 ,

(30) 19962814.9 1999 12 23 (DE)

(71)

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(72)	65830	-	-	20
	60529			97
	60486	가	3	

(74)

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(54)

가

(MAO)

가 가

(MAO)

가

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( , WO - 96/23005, DE - A 19804970, DE - A 19744102, DE - A 19757540) ,

가

3

가

가

a)

b)

I

I  
 $M^1 R^1 R^2 R^3$

( ,  $M^1$  V ,

$R^1, R^2 R^3$  ,  $C_1 - C_{20}$  - ,  $C_1 - C_{20}$  - ,  $C_6 - C_{40}$  - , C  
 $6 - C_{40}$  - ,  $C_7 - C_{40}$  - ,  $C_7 - C_{40}$  - ,  $R^1, R^2 R^3$  ,  
 $3 R^1, R^2 R^3 C_2 - C_{20}$  ,  $R^1, R^2 R^3$  , N - ,  
 가 , , , , N,N - , N,N - , N,N - 2,4,6 - ,  
 , , , , p - - N,N - , p -  
 - N,N - , , (p - ) , ( )  
 , ( ) , , 1,9 - N,N,N,N - - 1,8 - ,  
 ( ) , ( ) , ( ) , ( ) , ( ) ,  
 ( ) , ( ) , (n - ) , ( ) , ( ) , ( )  
 , N,N - , N - - N - , N,N - ( ) (2,4,6 - ,  
 ( ) , ( ) , (i - ) ,

(c) ,

(d) II 가

II  
 $R_a^4 M^2 (-O - M^2 R_b^5)_c$

( ,  $R^4 R^5$  ,  $C_1 - C_{40}$  ,  $C_1 - C_{20}$  - ,  $C_1 - C_{20}$   
 - ,  $C_1 - C_{10}$  - ,  $C_6 - C_{20}$  - ,  $C_6 - C_{20}$  - ,  $C_6 - C_{20}$  - ,  $C_7 - C_{40}$  - ,  $C_7 - C$   
 $40 -$  ,  $C_7 - C_{40}$  - ,  $C_7 - C_{40}$  - ,  $R^4 - OSiR_3$  ( , R  
 ,  $R^5$  ,

$M^2$  , III ,

a, b c 0, 1, 2 3 , a + b + c 0 ,

e) III 가

III  
 $[M^3 R_d^6]_e$

( ,  $M^3$  I, II III ,

$R^6$  ,  $C_1 - C_{40}$  ,  $C_1 - C_{20}$  - ,  $C_6 - C_{40}$  - ,  $C_7$   
 -  $C_{40}$  -  $C_7 - C_{40}$  - ,

d 1 3 ,

e 1 4 )

$R^1, R^2, R^3$ ,  $C_1 - C_{20}$ ,  $C_1 - C_{20}$ ,  $C_6 - C_{40}$ ,  $C$   
 $6 - C_{40}$ ,  $C_7 - C_{40}$ ,  $C_7 - C_{40}$ ,  $2$ ,  $3$   
 $R^1, R^2, R^3$  가  $C_2 - C_{20}$ ,  $R^1, R^2, R^3$ ,  $P, O, S$   
 $N$ ,  $/$ ,  $2$ ,  $20$   
 $I$  가,  $R^1, R^2, R^3$ ,

$N,N$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -  
 $-p$ -,  $N,N$ -,  $-p$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -  
 $N,N$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -  
 $N,N$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -,  $N,N$ -  
 $tert$ -,  $N'$ -,  $N,N$ -,  $N$ -,  $N$ -,  $N$ -,  $N$ -  
 $N$ -,  $N$ -,  $-1$ -,  $N$ -,  $-2$ -,  $N$ -,

$N,N$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  $N,N$ -,  $-2$ -,  $N,N$ -  
 $-3$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  $-3$ -,  $N,N$ -,  
 $N,N$ -,  $-2$ -,  $N,N$ -,  $-3$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  
 $N,N$ -,  $-4$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  $N,N$ -,  $-2$ -,  
 $N,N$ -,  $-3$ -,  $N,N$ -,  $-4$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  $-3$ -,  
 $N,N$ -,  $-4$ -,  $N,N$ -,  $-5$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  
 $-3$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  $N,N$ -,  
 $N,N$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  $-3$ -,

$N,N$ -,  $-4$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  $-3$ -,  $N,N$ -,  $-4$ -,  
 $N,N$ -,  $-5$ -,  $N,N$ -,  $-6$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  
 $-3$ -,  $N,N$ -,  $-4$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  
 $N,N$ -,  $N,N$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  
 $N,N$ -,  $-2$ -,  $N,N$ -,  $-3$ -,  $N,N$ -,  $-3$ -,  
 $N,N$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  $-3$ -,  $N,N$ -,  $-2$ -,  
 $N,N$ -,  $-3$ -,  $N,N$ -,  $-4$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  
 $-$ ,  $N,N$ -,  $-2$ -,  $N,N$ -,  $-3$ -,  $N,N$ -,  $-4$ -,  $N,N$ -,  
 $2$ -,  $N,N$ -,  $-3$ -,  $N,N$ -,  $-4$ -,  $N,N$ -,  $-5$ -,  $N$ -,  
 $N$ -,  $-2$ -,  $N,N$ -,  $-3$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  
 $N,N$ -,  $N,N$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  $-3$ -,  
 $N,N$ -,  $-4$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  $-3$ -,  $N,N$ -,  $-4$ -,  
 $N,N$ -,  $-5$ -,  $N,N$ -,  $-6$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  
 $-3$ -,  $N,N$ -,  $-4$ -,  $N,N$ -,  $-2$ -,  $N,N$ -,  
 $N,N$ -,  $N$ -,  $-N$ -,  $N$ -,  $-N$ -,  $-2$ -,  $N$ -,  
 $-N$ -,  $N$ -,  $-N$ -,  $-2$ -,  $N$ -,  $-N$ -,  $-3$ -,  $N$ -,  
 $-$ ,  $N$ -,  $-N$ -,  $-3$ -,  $N$ -,  $-N$ -,  $-2$ -,

, N- -N- -3- , N- -N- -2- , N- -N- -3- , N-  
 -N- -4- , N- -N- -2- , N- -N- -  
 -N- -2- , N- -N- -3- ,

N- -N- -4- , N- -N- -2- , N- -N- -3- , N-  
 -N- -4- , N- -N- -5- , N- -N- -2- , N- -N-  
 - -3- , N- -N- -2- , N- -N- -  
 - , N- -N- -  
 , N- -N- -4- , N- -N- -2- , N- -N- -3- , N-  
 -N- -4- , N- -N- -5- , N- -N- -6- , N- -  
 N- -2- , N- -N- -3- , N- -N- -4- , N- -N-  
 -2- , N- -N- , N- -N- -  
 , N- (2- ) , N- ( ) , N- (2- ) , N- (3-  
 ) , N- (2- ) , N- (3- ) , N- , N-  
 (2- ) , N- (3- ) , N- (2- ) , N- (3- ) , N-  
 (4- ) , N- (2- ) , N- (2- ) , N-  
 (3- ) , N- (4- ) , N- (2- ) , N- (3- ) ,  
 N- (4- ) , N- (5- ) , N- (2- ) , N- (3-  
 ) , N- (2- ) , N- ( ) , N- ( ) ,

N- , N- (2- ) , N- (3- ) ,

N- (4- ) , N- (2- ) , N- (3- ) , N- (4-  
 ) , N- (5- ) , N- (6- ) , N- (2- ) , N-  
 (3- ) , N- (4- ) , N- (2- ) , N- ( )  
 , N- ( ) , N- (2- ) , N- (2- ) , N- ( )  
 ) , N- (2- ) , N- (3- ) , N- (2- ) , N- (3-  
 ) , N- (2- ) , N- (3- ) , N- (2- ) , N- (2-  
 ) , N- (3- ) , N- (4- ) , N- (2- ) , N-  
 (2- ) , N- (3- ) , N- (4- ) , N- (5- )  
 , N- (2- ) , N- (3- ) , N- (2- ) , N-  
 ( ) , N- ( ) , N- ( ) , N- (2- ) , N-  
 (3- ) , N- (4- ) , N- (2- ) , N- (3- ) , N-  
 (4- ) , N- (5- ) , N- (6- ) , N- (2- )  
 , N- (3- ) , N- (4- ) , N- (2- ) , N-  
 ( ) , N- ( ) .

, N- , N- , N- , N- tert -  
 , N' - -N,N- , N- , N- , N- , N-  
 , N- -1- , N- -2- , N- .

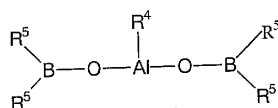
가  
 , MgO, ZrO<sub>2</sub>, TiO<sub>2</sub>, B<sub>2</sub>O<sub>3</sub>, CaO, ZnO, ThO<sub>2</sub>, Na<sub>2</sub>CO<sub>3</sub>, K<sub>2</sub>CO<sub>3</sub>,  
 CaCO<sub>3</sub>, MgCl<sub>2</sub>, Na<sub>2</sub>SO<sub>4</sub>, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, BaSO<sub>4</sub>, KNO<sub>3</sub>, Mg(NO<sub>3</sub>)<sub>2</sub>, Al(NO<sub>3</sub>)<sub>3</sub>, Na<sub>2</sub>O, K<sub>2</sub>O, Li<sub>2</sub>O  
 / Mg - Al

가  
 가  
 0 μm, 10 1000 m<sup>2</sup>/g, 150 500 m<sup>2</sup>/g 1 50  
 5 350 μm, 10 200 μm

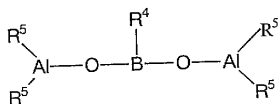
가 0.5 4.0 ml/g, 1.0 3.5 ml/g  
 (opening) ( ) 가  
 2 50 nm

가  
 II . M<sup>2</sup> 가 II  
 II (cage)  
 II 2 가  
 가 가 (d) IV V 가

IV

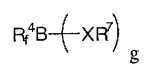


V

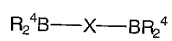
R<sup>4</sup> R<sup>5</sup> II

VII / VIII IX VI /

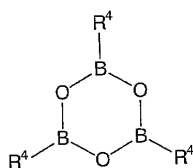
VI



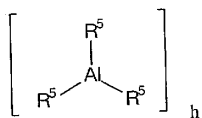
VII



VIII



IX



, R<sup>7</sup>  
C<sub>7</sub> - C<sub>40</sub> - , R<sup>4</sup> 가 R<sup>5</sup> C<sub>1</sub> - C<sub>40</sub> II , C<sub>1</sub> - C<sub>20</sub> - , C<sub>6</sub> - C<sub>20</sub> - , C<sub>7</sub> - C<sub>40</sub> - .

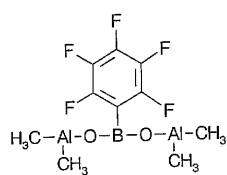
X VI NR , R C<sub>1</sub> - C<sub>20</sub> - ,  
C<sub>1</sub> - C<sub>20</sub> - C<sub>1</sub> - C<sub>20</sub> - ,

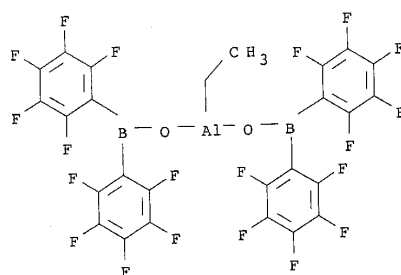
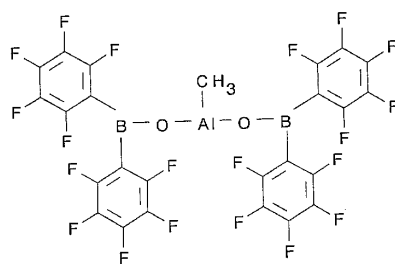
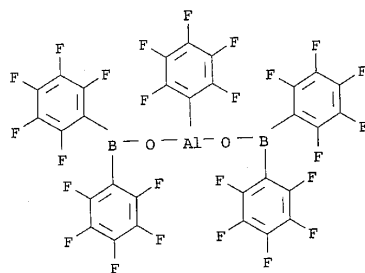
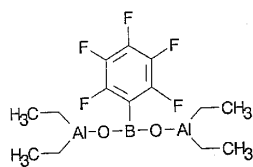
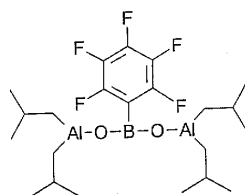
f 0 3 ,

g 0 3 , f + g 0 ,

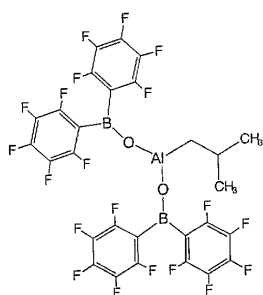
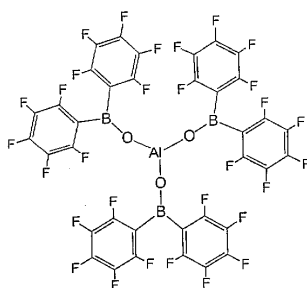
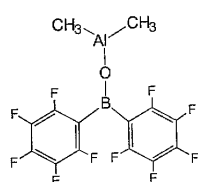
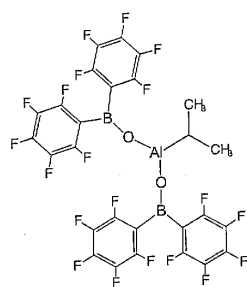
h 1 10 .

가 IV V .









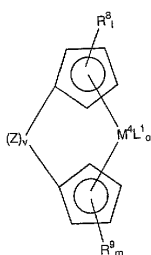
III 가  $M^4$  가 , / , ,  
 . III 가 , , ,  
 , , , - n - , , -  
 n - , , , , ,  
 , , , , ,  
 , , , , , O - .

가 가 ( EP - A - 0,129,368, EP - A - 0,561,479, EP - A - 0,545,304 EP - A - 0,576,970 ), 가  
 ( , EP - A - 0,416,815 ),  
 ( , EP - A - 0,632,063 ), p - -  
 ( EP - A - 0,659,758 ) - - ( , EP  
 - A - 0,661,300 ) .

가 가 가 .  
 III IV 가 . [D.H. McConville et al, Macromolecules, 1996, 29, 5241] [D. H. McConville et al, J. Am. Chem. Soc., 1996, 118, 10008] .  
 VIII ( ,  $Ni^{2+}$   $Pd^{2+}$  ) . [Brookhart et al, J. Am. Chem. Soc. 1995, 117, 6414] [Brookhart et al, J. Am. Chem. Soc., 1996, 118, 267]  
 . [Brookhart et al, J. Am. Chem. Soc. 1998, 120, 4049] [Gibson et al, Chem. Commun, 1998, 849]  
 , VIII 2,6 - ( ) 가 . WO 98/22486 .

X 가 가 .

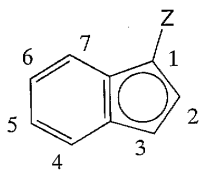
X



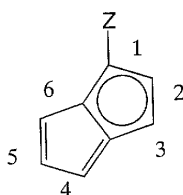
,  $M^4$  III , IV , V VI , Ti, Zr Hf .



Xla



Xlb



7. [Xla, Xlb] 2, 4, 2, 4, 2, 4, 5, 2, 4, 6, 2, 4, 5, 6, C<sub>1</sub> - C<sub>20</sub>, C<sub>1</sub> - C<sub>10</sub>, C<sub>6</sub> - C<sub>20</sub>.

X가 - -

가 . , - -

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(4 - )

(2 - )

(2 - )

$$(2 - \quad - 4 - (1 - \quad) \quad)$$
$$(2 - \quad - 4 - (2 - \quad) \quad)$$

(2 - - 4 - )

(2 - - 4 - t - )

(2 - - 4 - )

(2 - - 4 - )

(2 - - 4 - - )

(2,4 - )

(2 - )

(2 - - 4 - )

(2 - - 4 - )

(2 - - 4,5 - )

(2 - - 4,6 - )

(2 - - 4,5 - )

(2,4,6 - )

(2,5,6 - )

(2,4,7 - )

(2 - - 5 - )

(2 - - 5 - t - )

( ) (2 - - 4 - )

( ) (2 - - 4,6 - )

( ) (2 - - 4 - )

( ) (2 - - 4,5 - )

( ) (2 - - 4,5 - ( ) )

( ) (2 - - 4,5 - ( ) )

( ) (2 - - 4 - - )

( ) (2 - )

( ) (2 - - 5 - )

1,2 - (2 - - 4 - )

1,4 - (2 - - 4 - )

1,2 - (2 - - 4,6 - )

1,4 - (2 - - 4 - )

1,4 - (2 - - 4,5 - )

1,2 - (2 - - 4,5 - )

1,2 - (2,4,7 - )

1,2 - (2 - )

1,4 - (2 - )

[4 - ( <sup>5</sup> - ) - 4,6,6 - - ( <sup>5</sup> - 4,5 - )]

[4 - ( <sup>5</sup> - 3' - ) - 4,6,6 - ( <sup>5</sup> - 4,5 - )]

[4 - ( <sup>5</sup> - 3' - ) - 4,6,6 - ( <sup>5</sup> - 4,5 - )]

[4 - ( <sup>5</sup> - ) - 4,7,7 - ( <sup>5</sup> - 4,5,6,7 - )]

[4 - ( <sup>5</sup> - ) - 4,7,7 - ( <sup>5</sup> - 4,5,6,7 - )]

[4 - ( <sup>5</sup> - ) - 4,7,7 - ( <sup>5</sup> - 4,5,6,7 - )]

[4 - ( <sup>5</sup> - 3' = - tert - ) - 4,7,7 - ( <sup>5</sup> - 4,5,6,7 - )]

[4 - ( <sup>5</sup> - 3' = - ) - 4,7,7 - ( <sup>5</sup> - 4,5,6,7 - )]

[4 - ( <sup>5</sup> - 3' = - ) - 4,7,7 - ( <sup>5</sup> - 4,5,6,7 - )]

[4 - ( <sup>5</sup> - 3' = - ) - 2 - - 4,7,7 - ( <sup>5</sup> - 4,5,6,7 - )]

[4 - ( <sup>5</sup> - 3' = - tert - ) - 4,7,7 - ( <sup>5</sup> - 4,5,6,7 - )]

(tert - )( - <sup>5</sup> - )

(tert - )( - <sup>5</sup> - ) - 1,2 -

( )( - <sup>5</sup> - )

( )( - <sup>5</sup> - ) - 1,2 -

(tert - )(2,4 - - 2,4 - - 1 - )

( )

(n - )

(1,3 - )

$${}^5-9H - \frac{-[1 - ({}^5-1H - 1 - )]}{-9 - ( )}] - 3 - ({}^5 - -2,4 - 1 - ) - 3 - ($$
$$-2,4 - \begin{matrix} -[2 - [ & ( & ^5 - 2 - & -1H - & -1 - & ) \\ -1 - & ) - 5 - ( & ^5 - 9H - & -9 - & ) & ] \end{matrix} - 5 - ( \quad ^5 - 2,3,4,5 -$$
$$^5-9H- \frac{-[1-[(^5-1H- -1- )]-6-(^5- -2,4- -1- )-6-($$

(2 - - 4 - (4' - tert - )

$$(2 - \quad - 4 - (4' - \quad))$$
$$(2 - \quad - 4 - (4' - \quad))$$
$$(2 - \quad - 4 - (4' - \quad))$$

(2 - - 4 - (4' - )

(2 - - 4 - (4' - tert - )

$$(2 - \quad - 4 - (4' - \quad))$$
$$(2 - \quad - 4 - (4' - \quad))$$
$$(2 - \quad - 4 - (4' - \quad))$$

(2 - - 4 - (4' - )

(2 - - 4 - (4' - tert - ) -

$$(2 - \quad - 4 - (4' - \quad) -$$
$$(2 - \quad - 4 - (4' - \quad) -$$
$$(2 - \quad - 4 - (4' - \quad) -$$
$$(2 - \quad - 4 - (4' - \quad) -$$

(2 - - 4 - (4' - tert - ) -

$$(2 - \quad - 4 - (4' - \quad) -$$
$$(2 - \quad - 4 - (4' - \quad) -$$
$$(2 - \quad - 4 - (4' - \quad - \quad))$$

(2 - - 4 - (4' - )

(2 - - 4 - (4' - ) )  
 (2 - - 4 - (4' - ) )  
 (2 - - 4 - (4' - ) )  
 (2 - - 4 - (4' - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - ) )  
 (2 - - 4 - (4' - n - ) )  
 (2 - - 4 - (4' - n - ) )  
 (2 - - 4 - (4' - ) )  
 (2 - - 4 - (4' - sec - ) )  
 (2 - - 4 - ) )  
 (2 - - 4 - (4' - ) )  
 (2 - - 4 - (4' - ) )  
 (2 - - 4 - (4' - n - ) )  
 (2 - - 4 - (4' - n - ) )  
 (2 - - 4 - (4' - ) )  
 (2 - - 4 - (4' - ) )  
 (2 - - 4 - (4' - ) )  
 (2 - - 4 - (4' - sec - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - n - - 4 - ) )  
 (2 - n - - 4 - (4' - ) )  
 (2 - n - - 4 - (4' - ) )  
 (2 - n - - 4 - (4' - - ) )



(2 - n -        - 4 - (4' - n -        )        )  
 (2 - n -        - 4 - (4' -        )        )  
 (2 - n -        - 4 - (4' -        )        )  
 (2 - n -        - 4 - (4' - sec -        )        )  
 (2 - n -        - 4 - (4' - tert -        )        )  
 (2 - n -        - 4 -        )        )  
 (2 - n -        - 4 - (4' -        )        )  
 (2 - n -        - 4 - (4' -        )        )  
 (2 - n -        - 4 - (4' - n -        )        )  
 (2 - n -        - 4 - (4' -        -        )        )  
 (2 - n -        - 4 - (4' - n -        )        )  
 (2 - n -        - 4 - (4' -        )        )  
 (2 - n -        - 4 - (4' -        )        )  
 (2 - n -        - 4 - (4' - sec -        )        )  
 (2 - n -        - 4 - (4' - tert -        )        )  
 (2 -        - 4 -        )        )  
 (2 -        - 4 - (4' -        )        )  
 (2 -        - 4 - (4' -        )        )  
 (2 -        - 4 - (4' - n -        )        )  
 (2 -        - 4 - (4' -        -        )        )  
 (2 -        - 4 - (4' - n -        )        )  
 (2 -        - 4 - (4' -        )        )  
 (2 -        - 4 - (4' -        )        )  
 (2 -        - 4 - (4' - sec -        )        )  
 (2 -        - 4 - (4' - tert -        )        )

(2 - - 4 - (4' - tert - ) ) ( )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - n - - 4 - (4' - tert - ) )  
 (2 - n - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - n - - 4 - ) )  
 (2 - - 4 - (4' - tert - ) ) ( )  
 (2 - - 4 - (4' - tert - ) ) ( )  
 (2 - - 4 - (4' - tert - ) ) ( )  
 (2 - - 4 - (4' - tert - ) )  
 (2 - - 4 - (4' - tert - ) )  
 " 가 , .  
 (2,4 - - tert - )  
 (2,6 - - tert - )

(3,5 - - tert - )

(2,6 - - sec - )

(2,4 - - )

(2,3 - - )

(2,5 - - )

(2,6 - - )

(3,4 - - )

(3,5 - - )

(2 - )

(3 - )

(4 - )

(2 - )

(3 - )

(4 - )

(2 - sec - )

(2 - tert - )

(3 - tert - )

(4 - sec - )

(4 - tert - )

(2 - - 5 - )

(4 - - 3 - )

(5 - - 2 - )

(5 - - 3 - )

(2,4 - - (2 - - 2 - ) )



, X III 가  
 , X  
 , III 가  
 100:1  $10^{-4}$  :1 . 1:1  $10^{-2}$  :1 .  
 II 가 가 , X I  
 III 가 가 X 가 .  
 X X 10 g:1  $\mu$ mol  $10^{-2}$  g:1  $\mu$ mol .  
 100:1  $10^{-4}$  :1, ( 1:1  $10^{-2}$  :1 . )  
 - 40 110 , - 10  
 70 .  
 가 . - 가  
 .  
 , .  
 , 가 .  
 R -CH=CH- R ( , R R , , , 10  
 , , 1 20 , 1 10  
 가 ) , R R  
 ) , 1 - , ,  
 , 1 - , 1 - , 4 - - 1 - , 1 - , , 1,3 - 1,4 - , ,  
 가 .  
 ,  $C_3$  -  $C_{20}$  - 1 - , /  
 $C_4$  -  $C_{20}$  - , 1,3 - ,  
 - 60 300 , 30 250 . 0.5 2500 ,  
 2 1500 . , , ,  
 , ,  
 , .  
 ( )(  
 )  
 가 , 2 ,  
 / 가 가 .

가 ,

Al ,

/ 가 ,

0.5 2500 , 2 1500 .

$10^{-8}$  ,  $10^{-4}$   $10^{-7}$  dm<sup>3</sup> dm<sup>3</sup>  $10^{-3}$

, , , O - .

가 , ,

가 kg Al 200 0.001 mmol ( ,

가 kg Al 10 0.01 mmol AI/M<sup>1</sup> 가 .

(antistatic) 가 가

N - (DE - A - 3,543,360 ) C<sub>12</sub> - C<sub>22</sub> - .

EP - A - 0,107,127 .

, EP - A - 0,636,636 ,

R<sup>450</sup>, ASA<sup>R</sup> - 3 ICI , 163 , 1 - SO<sub>2</sub> 1 - .

; R<sup>450</sup> 163 , X 1 50 %, 5 25 %

( ) .

( ) .

가 0 100 .

가 0 100 가 0.1 24 .

0.1 5 .

가 .

(main) (group)

(Schlenk ).

(desiccant)

1: ( )

2.1 g ( 2M, 20 mmol) 10 ml 40 ml 가 . - 10 , 50 m  
(10 mmol) 15 가 . - 10 1  
(RT) 가 1 G4 . ,  
( ) ( 0.1M) .

2: [ ( ) ]

6.92 g ( 2M, 10 mmol) 5 ml 45 ml . - 10 , 50 m  
( ) (20 mmol) 15 가 . - 10  
0.5 (RT) 가 1 G4  
( [ ( ) ] ) (Al 0.1M)

2A: [ ( ) ]

6.92 g ( 2M, 10 mmol) 5 ml 45 ml . 25 , 50 ml  
( ) (20 mmol) 15 가 . 25 1  
( ) G4 . , ([ ( )  
(Al 0.1M) .

3: ( ) ( )

6.92 g ( 2M, 10 mmol) 5 ml 40 ml . - 10 , 50 m  
( ) (20 mmol) 5.12 g ( ) (10 mmol)  
15 가 . - 10 0.5 (RT) 가 1  
G4 . ,

4: ( )

SiO<sub>2</sub> (PQ MS3030, 10 mbar, 10 , 140 ) 2 g 30 ml N,N -  
 0.6 ml 가 0 , 1 50 ml  
 가 , 3 , , 3.3 g

5: [ ( ) ]

SiO<sub>2</sub> (PQ MS3030, 10 mbar, 10 , 140 ) 2 g 30 ml N,N -  
 0.48 ml 가 0 , 2 40 ml  
 가 , 3 , , 4.01 g

6: 3

SiO<sub>2</sub> (PQ MS3030, 10 mbar, 10 , 140 ) 2 g 30 ml N,N -  
 0.48 ml 가 0 , 3 40 ml  
 가 , 3 , , 4.5 g

7: 1

4 0.5 g 3 ml 5.8 mg (2 - - 4 - )  
 (10 μ mol) 가 , (TMA)( 2 M,  
 20 μ mol) 0.01 ml 가 1 ,

8: 2

5 ml 7 mg (2 - - 4 - (4' - tert - ) (10 μ m  
 ol) TMA( 2M, 40 μ mol) 0.02 ml 40 , 5 0.44  
 g 가 1 ,

9: 3

6 0.2 g 3 ml 3.3 mg (2 - - 4 - (4' - tert  
 - ) (5 μ mol) 가 1 ,

10: 1

2L 1.5L  
 (TIBA)( 20% ) 3 ml 가 , 15 , 7  
 1 20 ml , 15 ml 60  
 가 , 1  
 (PP) 160 g



. 28 kg PP/ g x h .

11: 2

2L , 1.5L . TIBA( 20%  
) 3 ml 가 , 15 , 8 3 20 ml  
 , 15 ml . 60 가 , 1  
 .  
 (PP) 255 g  
 36 kg PP/ g x h .

12: 3

2L , 1.5L . TIBA( 20%  
) 3 ml 가 , 15 , 9 3 20 ml  
 , 15 ml . 60 가 , 1  
 .  
 (PP) 145 g  
 44 kg PP/ g x h .

(57)

1.

(a) ,

(b) l

[ l]

$M^1 R^1 R^2 R^3$

( ,  $M^1$  V ,

[illegible]

(c) \_\_\_\_\_,

(d)                    II                    가

[ 11 ]

$$R_a^4 M^2 (-O-M^2 R_b^5)_c$$
$$\left( \begin{array}{c} R^4 \\ R^5 \end{array} \right), \quad C_{1-40}, \quad R^4 - OSiR_3 \quad \left( \begin{array}{c} R^4 \\ R^5 \end{array} \right), \quad R^5$$
$$M^2 \quad , \quad III \quad ,$$

a, b c 0, 1, 2 3 , a + b + c 0 , )

•

2.

1, (e) III 가 가 .

$$[ \quad \quad \quad ]$$
$$[M^3 R^6_d]_e$$

( , M<sup>3</sup> I, II III ,

$$\mathbb{R}^6, \quad , \quad , \quad C_1 - C_{40}, \quad ,$$

d 1 3 ,

e 1 4 )

3.

1 2 , I R<sup>1</sup>, R<sup>2</sup> R<sup>3</sup> , 2 20  
/ P, O, S N .

4.

1 3 , 가 .

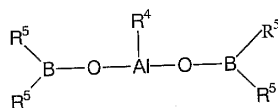
5.

1 4 , M<sup>2</sup>가 II 가 .

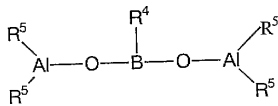
6.

1 5 , IV / V 가 .

[ IV]



[ V]



( , R<sup>4</sup> R<sup>5</sup> , R<sup>5</sup> , C<sub>1</sub> - C<sub>40</sub> , R<sup>4</sup> - OSiR<sub>3</sub> )

7.

a) ,

b) I

[ I]

M<sup>1</sup> R<sup>1</sup> R<sup>2</sup> R<sup>3</sup>

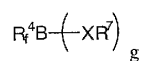
( , M<sup>1</sup> V ,

$R^1, R^2, R^3$ ,  $C_1 - C_{20}$ ,  $C_1 - C_{20}$ ,  $C_6 - C_{40}$ ,  $C$   
 $6 - C_{40}$ ,  $C_7 - C_{40}$ ,  $C_7 - C_{40}$ ,  $2$ ,  $3$   
 $R^1, R^2, R^3, C_2 - C_{20}$ ,  $R^1, R^2, R^3$ ,  $N$ -  
가,  $N,N$ - $N,N$ - $N,N$ -2,4,6-  
 $N,N$ - $p$ - $N,N$ - $p$ -  
 $N,N$ - $(p-)$ ,  $(p-)$ ,  
 $(p-)$ ,  $1,9-N,N,N,N$ - $1,8$ -  
 $(n-)$ ,  $(n-)$ ,  $(n-)$ ,  
 $N,N$ - $N$ - $N$ - $N,N$ - $(2,4,6-$   
 $(i-)$ ,

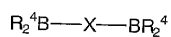
(c),

(d) VI / VII / VIII IX  
가

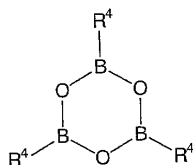
[ VI]



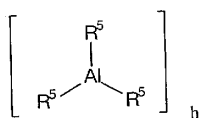
[ VII]



[ VIII]



[ IX]



( $R^7$ ,  $C_7 - C_{40}$  - 가  $C_1 - C_{40}$ ,  $C_1 - C_{20}$  -,  $C_6 - C_{20}$  -,  $C_7 - C_{40}$  -

$R^4$ ,  $R^5$ ,  $C_1 - C_{40}$ ,  $R^4 - OSiR_3$  ( $R^5$ ),

X, VI, NR, R,  $C_1 - C_{20}$  -

f 0 3,

g 0 3, f + g 0,

h 1 10)

.

8.

1 7.

9.

1 7

.