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2000 - 199805

2000 - 22

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2 2 1 2  
2

(CVD) , (TiO<sub>2</sub>) , 가 (TiO<sub>2</sub>) , 가 (CVD) , 가 450 550  
2, TiO<sub>2</sub> - Pt - RuO<sub>2</sub> , 가 (TiO<sub>2</sub>), ZnO, WO<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, SrTiO<sub>3</sub>, In<sub>2</sub>O<sub>3</sub>, MoO  
10 200nm 가

ISHIHARA SANGYO Co., Ltd.

(「STS-01」(X) 7 nm), 「STS-02」(X) 7 nm), 「C  
S-N」), TAKI CHEMICAL CO., LTD. 「M-6」(5 nm)  
ISHIHARA SANGYO Co., Ltd. 「ST-K01」, 「ST-K03」

가 Ti(OR)<sub>4</sub>(R) 4  
Ti(OR)  
m L<sub>n</sub> (m+n=4, n ≥ 0), L

1 100nm, 1 50nm

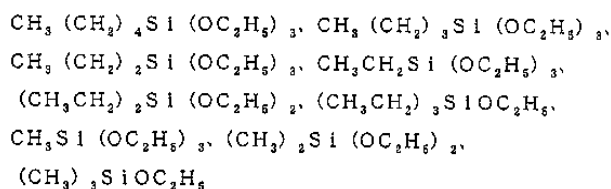
1 2

CH<sub>3</sub>(CH<sub>2</sub>)<sub>30</sub>SiCl<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>20</sub>SiCl<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>18</sub>SiCl<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>16</sub>SiCl<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>14</sub>SiCl<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>12</sub>SiCl<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>10</sub>SiCl<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>8</sub>SiCl<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>8</sub>SiCl<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>7</sub>SiCl<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>6</sub>SiCl<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>5</sub>SiCl<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>4</sub>SiCl<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>3</sub>SiCl<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>2</sub>SiCl<sub>3</sub>, CH<sub>3</sub>CH<sub>2</sub>SiCl<sub>3</sub>,  
(CH<sub>3</sub>CH<sub>2</sub>)<sub>2</sub>SiCl<sub>2</sub>, (CH<sub>3</sub>CH<sub>2</sub>)<sub>3</sub>SiCl,  
CH<sub>3</sub>SiCl<sub>3</sub>, (CH<sub>2</sub>)<sub>2</sub>SiCl<sub>2</sub>, (CH<sub>3</sub>)<sub>3</sub>SiCl

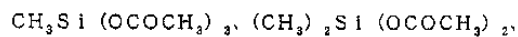
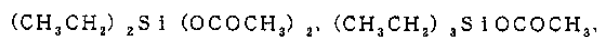
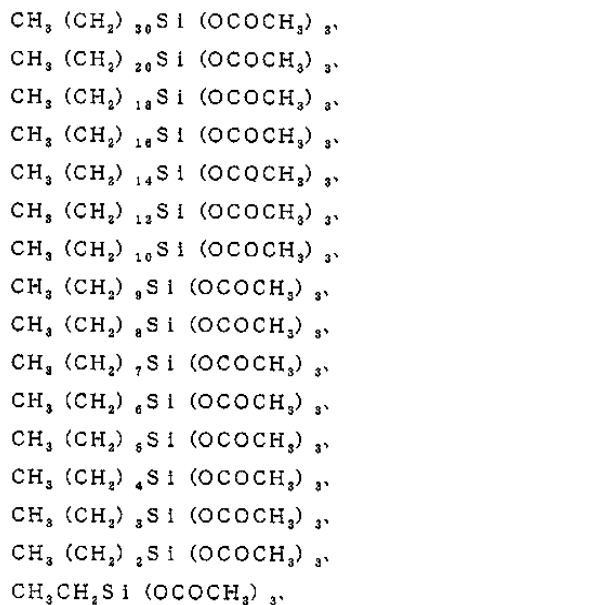
과 같은 알킬기 함유 클로로실란:

CH<sub>3</sub>(CH<sub>2</sub>)<sub>30</sub>Si(OCH<sub>3</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>20</sub>Si(OCH<sub>3</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>18</sub>Si(OCH<sub>3</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>16</sub>Si(OCH<sub>3</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>14</sub>Si(OCH<sub>3</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>12</sub>Si(OCH<sub>3</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>10</sub>Si(OCH<sub>3</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>8</sub>Si(OCH<sub>3</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>8</sub>Si(OCH<sub>3</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>7</sub>Si(OCH<sub>3</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>6</sub>Si(OCH<sub>3</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>5</sub>Si(OCH<sub>3</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>4</sub>Si(OCH<sub>3</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>3</sub>Si(OCH<sub>3</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>2</sub>Si(OCH<sub>3</sub>)<sub>3</sub>, CH<sub>3</sub>CH<sub>2</sub>Si(OCH<sub>3</sub>)<sub>3</sub>,  
(CH<sub>3</sub>CH<sub>2</sub>)<sub>2</sub>Si(OCH<sub>3</sub>)<sub>2</sub>, (CH<sub>3</sub>CH<sub>2</sub>)<sub>3</sub>SiOCH<sub>3</sub>,  
CH<sub>3</sub>Si(OCH<sub>3</sub>)<sub>3</sub>, (CH<sub>3</sub>)<sub>3</sub>Si(OCH<sub>3</sub>)<sub>2</sub>,  
(CH<sub>3</sub>)<sub>3</sub>SiOCH<sub>3</sub>,

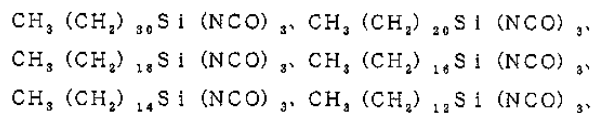
CH<sub>3</sub>(CH<sub>2</sub>)<sub>30</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>20</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>18</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>16</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>14</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>12</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>10</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>8</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>8</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>7</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>,  
CH<sub>3</sub>(CH<sub>2</sub>)<sub>6</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>, CH<sub>3</sub>(CH<sub>2</sub>)<sub>5</sub>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>,



와 같은 알킬기 함유 알콕시실란;



$(\text{CH}_3)_3\text{SiOCOCH}_3$  와 같은 알킬기 함유 아실록시실란;



$\text{CH}_3(\text{CH}_2)_{10}\text{Si}(\text{NCO})_3$ ,  $\text{CH}_3(\text{CH}_2)_9\text{Si}(\text{NCO})_3$ ,  
 $\text{CH}_3(\text{CH}_2)_8\text{Si}(\text{NCO})_3$ ,  $\text{CH}_3(\text{CH}_2)_7\text{Si}(\text{NCO})_3$ ,  
 $\text{CH}_3(\text{CH}_2)_6\text{Si}(\text{NCO})_3$ ,  $\text{CH}_3(\text{CH}_2)_5\text{Si}(\text{NCO})_3$ ,  
 $\text{CH}_3(\text{CH}_2)_4\text{Si}(\text{NCO})_3$ ,  $\text{CH}_3(\text{CH}_2)_3\text{Si}(\text{NCO})_3$ ,  
 $\text{CH}_3(\text{CH}_2)_2\text{Si}(\text{NCO})_3$ ,  $\text{CH}_3\text{CH}_2\text{Si}(\text{NCO})_3$ ,  
 $(\text{CH}_3\text{CH}_2)_2\text{Si}(\text{NCO})_2$ ,  $(\text{CH}_3\text{CH}_2)_3\text{SiNCO}$ ,  
 $\text{CH}_3\text{Si}(\text{NCO})_3$ ,  $(\text{CH}_3)_2\text{Si}(\text{NCO})_2$ ,  
 $(\text{CH}_3)_3\text{SiNCO}$  와 같은 알킬기 함유 이소시아네이트실란을  
 예시할 수 있다.

플루오로알킬기를 갖는 실란화합물로서는, 예컨대

$\text{CF}_3(\text{CF}_2)_{11}(\text{CH}_2)_2\text{SiCl}_3$ ,  
 $\text{CF}_3(\text{CF}_2)_{10}(\text{CH}_2)_2\text{SiCl}_3$ ,  
 $\text{CF}_3(\text{CF}_2)_9(\text{CH}_2)_2\text{SiCl}_3$ ,  
 $\text{CF}_3(\text{CF}_2)_8(\text{CH}_2)_2\text{SiCl}_3$ ,  
 $\text{CF}_3(\text{CF}_2)_7(\text{CH}_2)_2\text{SiCl}_3$ ,  
 $\text{CF}_3(\text{CF}_2)_6(\text{CH}_2)_2\text{SiCl}_3$ ,  
 $\text{CF}_3(\text{CF}_2)_5(\text{CH}_2)_2\text{SiCl}_3$ ,  
 $\text{CF}_3(\text{CF}_2)_4(\text{CH}_2)_2\text{SiCl}_3$ ,  
 $\text{CF}_3(\text{CF}_2)_3(\text{CH}_2)_2\text{SiCl}_3$ ,  
 $\text{CF}_3(\text{CF}_2)_2(\text{CH}_2)_2\text{SiCl}_3$ ,  
 $\text{CF}_3\text{CF}_2(\text{CH}_2)_2\text{SiCl}_3$ ,  
 $\text{CF}_3(\text{CH}_2)_2\text{SiCl}_3$  와 같은 플루오로알킬기 함유 트리클로로실란:  
 $\text{CF}_3(\text{CF}_2)_{11}(\text{CH}_2)_2\text{Si}(\text{OCH}_3)_3$ ,  
 $\text{CF}_3(\text{CF}_2)_{10}(\text{CH}_2)_2\text{Si}(\text{OCH}_3)_3$ ,  
 $\text{CF}_3(\text{CF}_2)_9(\text{CH}_2)_2\text{Si}(\text{OCH}_3)_3$ ,  
 $\text{CF}_3(\text{CF}_2)_8(\text{CH}_2)_2\text{Si}(\text{OCH}_3)_3$ ,  
 $\text{CF}_3(\text{CF}_2)_7(\text{CH}_2)_2\text{Si}(\text{OCH}_3)_3$ ,

$\text{CF}_3 (\text{CF}_2)_6 (\text{CH}_2)_2 \text{Si} (\text{OCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_5 (\text{CH}_2)_2 \text{Si} (\text{OCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_4 (\text{CH}_2)_2 \text{Si} (\text{OCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_3 (\text{CH}_2)_2 \text{Si} (\text{OCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_2 (\text{CH}_2)_2 \text{Si} (\text{OCH}_3)_3$ ,  
 $\text{CF}_3 \text{CF}_2 (\text{CH}_2)_2 \text{Si} (\text{OCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CH}_2)_2 \text{Si} (\text{OCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_{11} (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_{10} (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_9 (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_8 (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_7 (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_6 (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_5 (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_4 (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_3 (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_2 (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$ ,  
 $\text{CF}_3 \text{CF}_2 (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$ ,  
 $\text{CF}_3 (\text{CH}_2)_2 \text{Si} (\text{OC}_2\text{H}_5)_3$  와 같은 플루오로알킬기

함유 트리알콕시실란:

$\text{CF}_3 (\text{CF}_2)_{11} (\text{CH}_2)_2 \text{Si} (\text{OCOCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_{10} (\text{CH}_2)_2 \text{Si} (\text{OCOCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_9 (\text{CH}_2)_2 \text{Si} (\text{OCOCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_8 (\text{CH}_2)_2 \text{Si} (\text{OCOCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_7 (\text{CH}_2)_2 \text{Si} (\text{OCOCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_6 (\text{CH}_2)_2 \text{Si} (\text{OCOCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_5 (\text{CH}_2)_2 \text{Si} (\text{OCOCH}_3)_3$ ,  
 $\text{CF}_3 (\text{CF}_2)_4 (\text{CH}_2)_2 \text{Si} (\text{OCOCH}_3)_3$

$CF_3 (CF_2)_3 (CH_2)_2 Si (OCOCH_3)_3$ ,  
 $CF_3 (CF_2)_2 (CH_2)_2 Si (OCOCH_3)_3$ ,  
 $CF_3 CF_2 (CH_2)_2 Si (OCOCH_3)_3$ ,  
 $CF_3 (CH_2)_2 Si (OCOCH_3)_3$  와 같은 플루오로알킬기

함유 트리아실록시실란:

$CF_3 (CF_2)_{11} (CH_2)_2 Si (NCO)_3$ ,  
 $CF_3 (CF_2)_{10} (CH_2)_2 Si (NCO)_3$ ,  
 $CF_3 (CF_2)_9 (CH_2)_2 Si (NCO)_3$ ,  
 $CF_3 (CF_2)_8 (CH_2)_2 Si (NCO)_3$ ,  
 $CF_3 (CF_2)_7 (CH_2)_2 Si (NCO)_3$ ,  
 $CF_3 (CF_2)_6 (CH_2)_2 Si (NCO)_3$ ,  
 $CF_3 (CF_2)_5 (CH_2)_2 Si (NCO)_3$ ,  
 $CF_3 (CF_2)_4 (CH_2)_2 Si (NCO)_3$ ,  
 $CF_3 (CF_2)_3 (CH_2)_2 Si (NCO)_3$ ,  
 $CF_3 (CF_2)_2 (CH_2)_2 Si (NCO)_3$ ,  
 $CF_3 CF_2 (CH_2)_2 Si (NCO)_3$ ,  
 $CF_3 (CH_2)_2 Si (NCO)_3$  와 같은 플루오로알킬기 함유

트리아소시아네이트실란을 예시할 수 있다.

가 13 22

10 500 $\mu$ m

가

가

가

380nm

, YAG ( 3 , 4 ), He - Gd



100mol% 1 30%  
, 3 20%

(1) (2),  
R<sub>2</sub>SiQ<sub>2</sub> (2)  
( , R , , , Q )  
(2) R ( , 「 (2) , Q가 )  
, 가 (2)

(2) 가 , 가 가 ,  
100mol% (2) 50%  
, 3 40%

가 , 가 가 ( , ), ,  
가 가 가 , ,  
p- 3 200 , 10 100 1

가 가 가 가  
2 10 1.1 30 , 1.5 20 가 ,

( ) , , , ,  
가 , 가 가 가 가 가  
tert - 가 가 가 가 가 가 가 가

40 100 가 ,





FAS가 3.03 mm/sec  $\mu\text{m}$

15  $\mu\text{m}$  FAS

200 , 10 , FAS

, FAS ( 150 $\mu\text{m}$  ) , FAS 20

0 $\mu\text{m}$  , FAS 20,000 가 가 12

1 , 7 $\mu\text{m}$  (AFM) 3

2

425  $\pm 25\mu\text{m}$  가 5 가 , 7  $\pm 0.5\mu\text{m}$   $\pm 5.9\%$  , 400 2,500nm  $\pm 7.1\%$  가 ,

( ) 300 가 2 ,

가

2

1 1.5 가 , 1.44 % 4 가 2

(BzSiO<sub>3/2</sub>)

1 FAS

3.03mm/sec 가 , 1 , 15 , 2

00 30 가 FAS ( 150 $\mu\text{m}$  )

7 $\mu\text{m}$  , 20,000 가 가 120 $\mu\text{m}$

425  $\pm 20\mu\text{m}$  가 5 가 , 7  $\pm 0.3\mu\text{m}$   $\pm 4.7\%$  , 400 2,500nm  $\pm 4.3\%$  가 ,

가

가

3

2 FAS 2 3.03mm/sec 1 , F  
 AS ( 150 $\mu$ m ) ,  
 200 30 가 120 $\mu$ m 15 ,  
 20,000 가 가 3.3 $\mu$ m .

, 891  $\pm$  65 $\mu$ m 5 가 , 3.3  $\pm$  0.2 $\mu$ m  $\pm$  6.1% . 가 ,  
 $\pm$  7.3% . , 400 2,500nm 가 ,  
 가 가 가

4 81.2g 9.5g 0.26g 가 20  
 , 25 10 4.04g 0.1N 5.0g 가 2 5 . , 가 .  
 10g, (TiO<sub>2</sub> , 7nm, ISHIHARA SANGYO Co., Ltd.  
 「STS - 01」) 0.09g .  
 가 21 , 120 20 . ,  
 1 150 $\mu$ m 가 175 $\mu$ m 20,000  
 FAS 1 5 , FAS 1  
 0 ( ) , 4 ( ) 32 ( ) . 105 ( ) 6

2 , 15 1 3.03mm/sec FAS  
 , 200 , 10 , FAS  
 , FAS FAS ( 150 $\mu$ m ) 가 20  
 20,000 가 가 120 $\mu$ m ,  
 7 $\mu$ m .

430  $\pm$  21 $\mu$ m 5 가 , 7  $\pm$  0.3 $\mu$ m  $\pm$  4.3% . 가 ,  
 $\pm$  4.9% . , 400 2,500nm 가 ,  
 가 ( ) 300 2 ,  
 가 가



1.

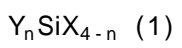
가 , 가 가 가 가 .  
1

2.

1 , 가 , , , , , 1

3.

1 , 가 (1)



( , Y , n 0 1 ) , X 가 .

4.

3 , (1) Y가 , X가 , n 1

5.

3 4 , 가 , 가 1 , 가 .

6.

5 , 100 mol% , 1  
30%

7.

3 6

, 가 , 가 , (2),

$R_2SiQ_2$  (2)

( , R , , , 가 • , Q )

8.

7 ,

(2) R , Q가

9.

7 8 ,

가 • 100 mol% , (2)  
50%

10.

1 9 ,

00 300 가 , 1

11.

1 10 ,

12.

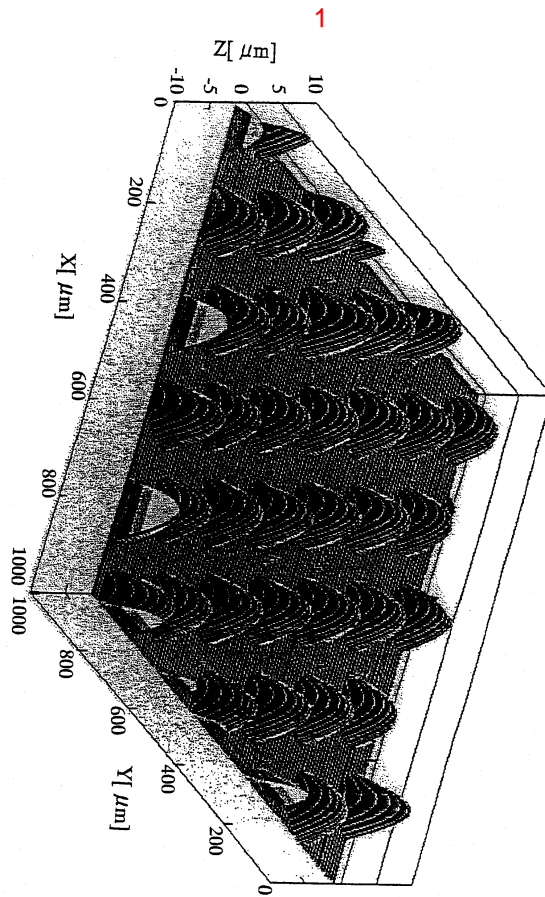
1 10 ,

13.

11

12

가



2

