NIL 응용 AR 실험 및 연구결과

❖ Nanoimprint

stamp

Release layer

Resist

Surface adhesion layer

❖ 장점: 가격이 저렴, 대량생산, 패턴 및 제품의 균일도(재현성)

❖ Experimental scheme

a) **Ni master**

Dual side

Imprint on Flexible polymer

b) **Ni master**

High resolution h-PDMS mold

Imprint

Optical property
1. Dual side patterning effect
2. Resin effect with low RI
3. Double replication method
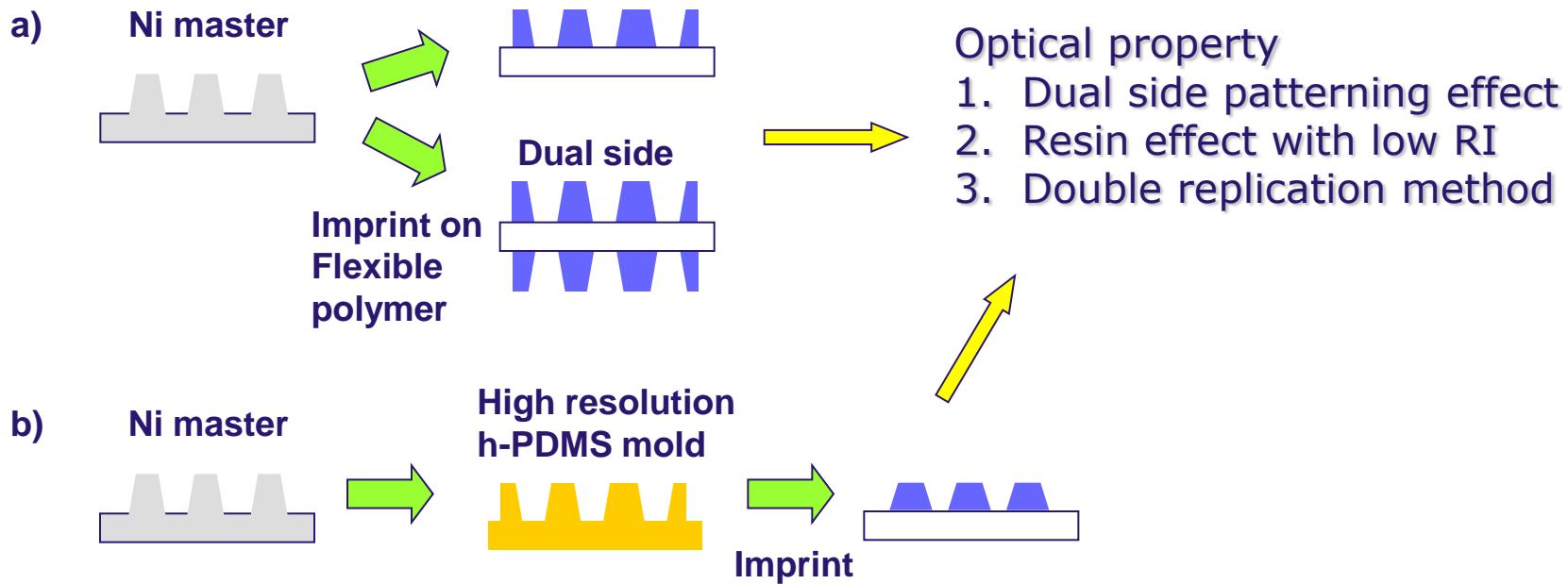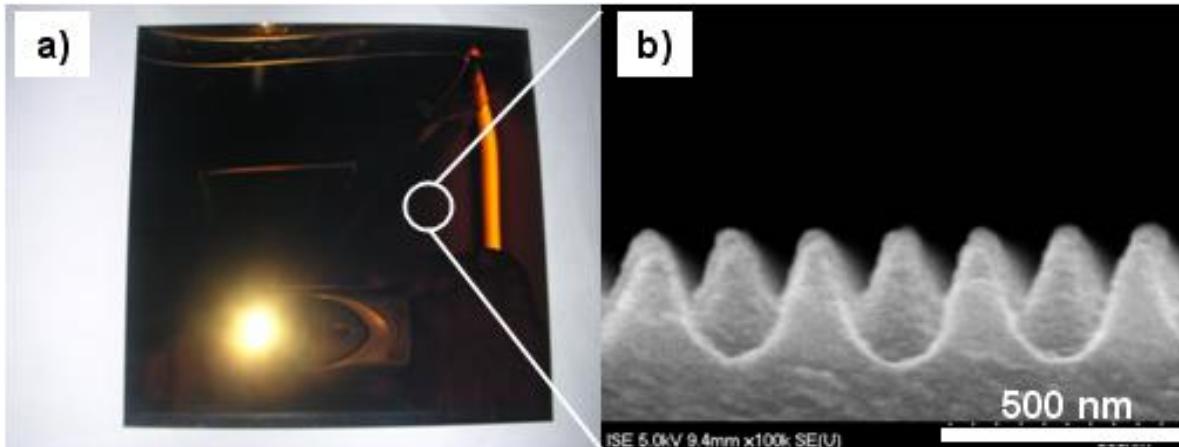
❖ Ni master

Ni Master
Active area of 120mm*120mm*150um
Pitch ~250nm
Peak-to-peak ~290nm
Depth ~230nm

Experiment

❖**Surface treatment**
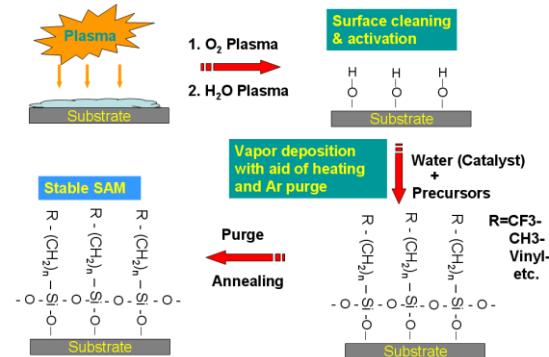
Result

❖ **Dual side patterning effect**

1st interface 2nd interface

Transmittance meas.-PC

Bare

Reflectance meas.-PC
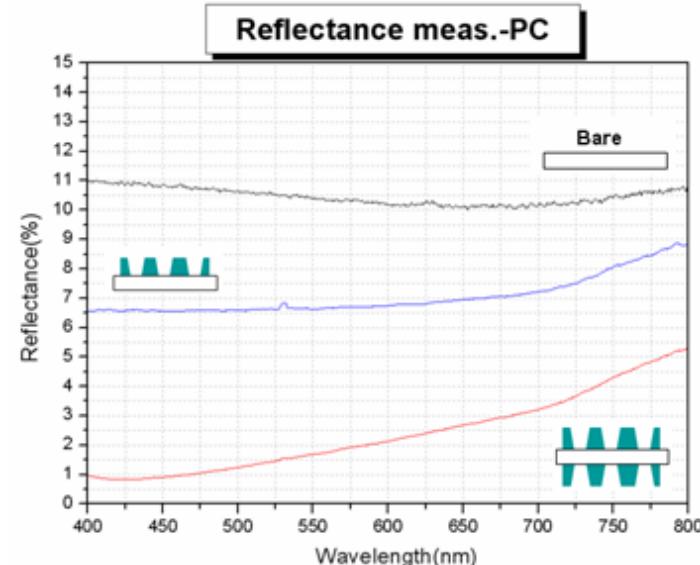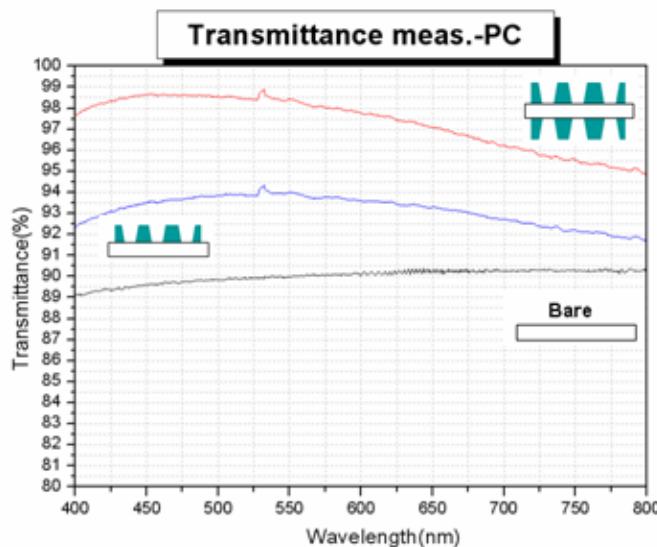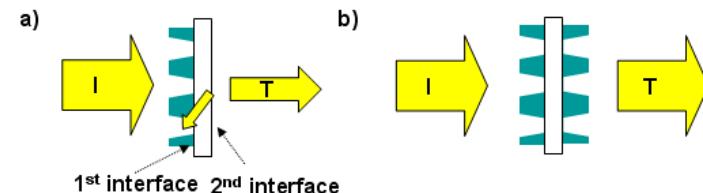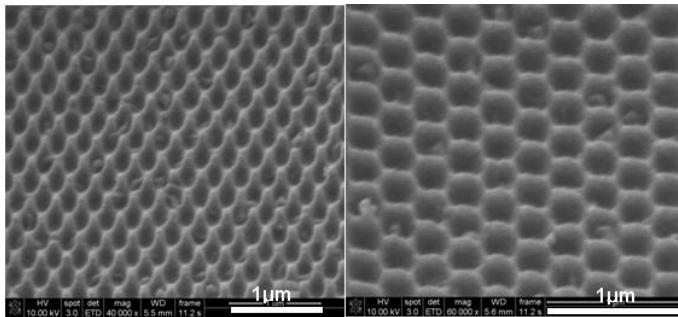
Bare

Result

Reference: polycarbonate film	R% (450nm)	R% (600nm)	T% (450nm)	T% (600nm)
Bare	10.9	10.2	89.6	90.1
Single side AR	6.57	6.74	93.5	93.6
Dual side AR	0.9	2.13	98.6	97.7

Result 2

❖ RI effect of Resin
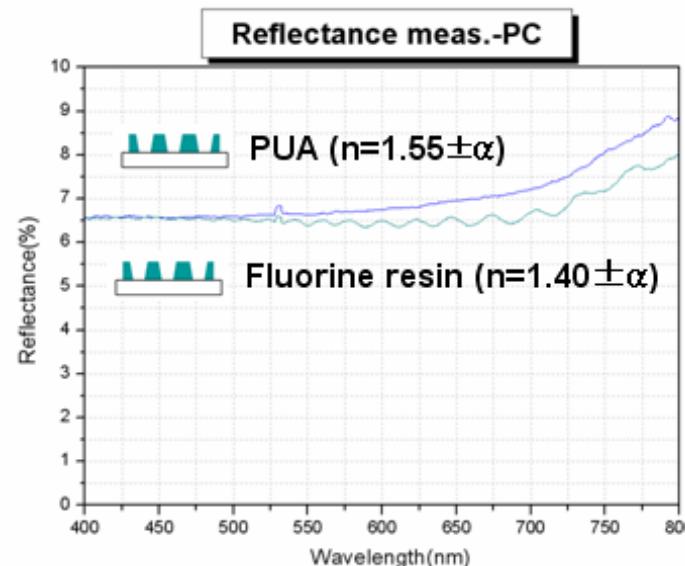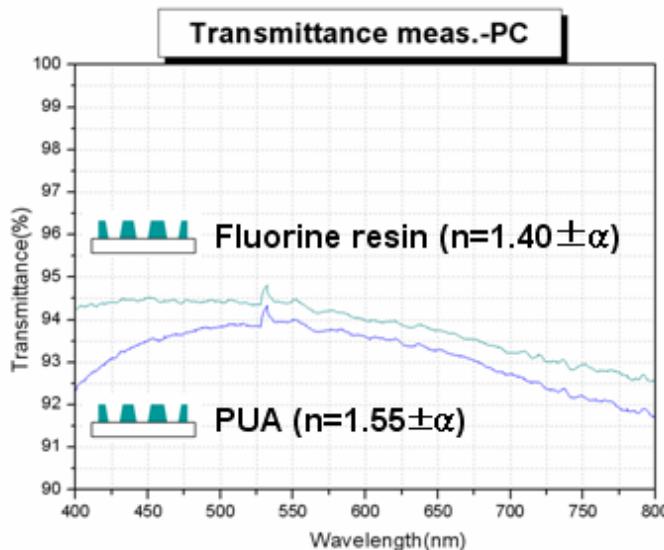
In the nanoscale porous AR structure, the Effective refractive index is also given as:

$$n_f = \sqrt{n^2_{bulk} - \left(n^2_{bulk} - 1\right)p}$$

If p is 0.4,

n_{bulk} is refractive index of bulk AR film

p is the porosity

n_f of AR film is about
1.36 for PUA resin and
1.26 for fluorine resin

# Result 3

❖ **Double replication method using HR-PDMS mold**

a)

b) 1μm

c) 4μm

→ Double replication

Transmittance meas.-PC

92
91
90
89
88
87

Bare

Transmittance(%)

400   500   600   700   800
Wavelength(nm)
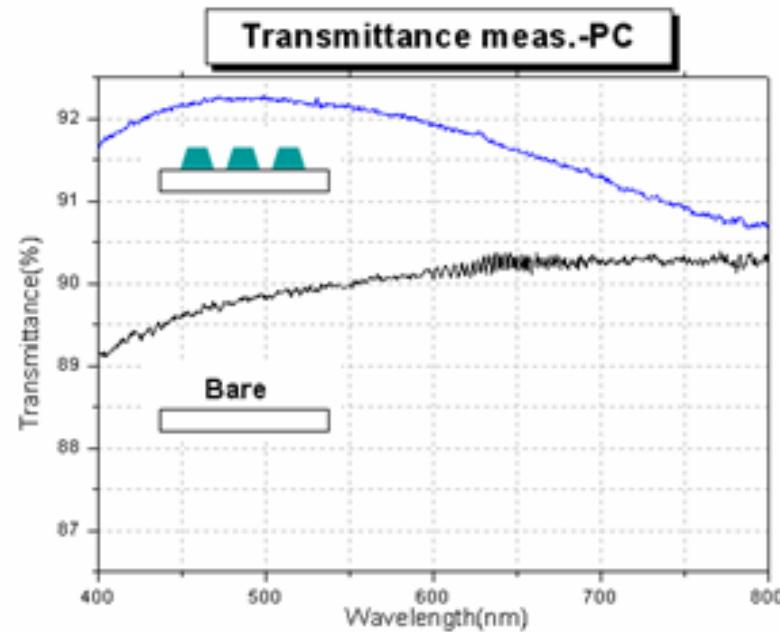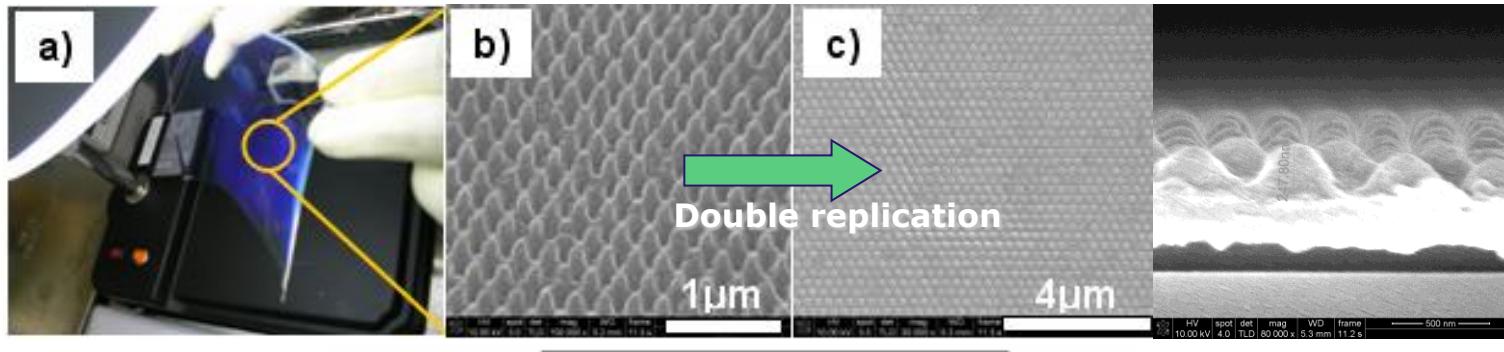
Summary

❖ **1. Dual side pattering effect**

❖ **2. Low refractive index material effect**

❖ **3. Double replication method using HR PDMS**

Future Work

❖ **1. Fabrication of low cost mold**

❖ **2. Optimum design for zero reflection**

Imprint

Reflectance meas.-PC
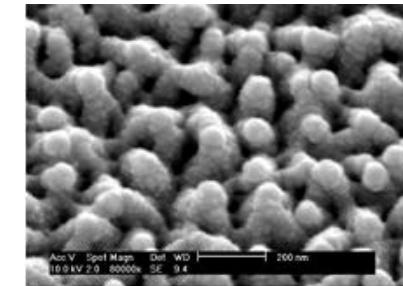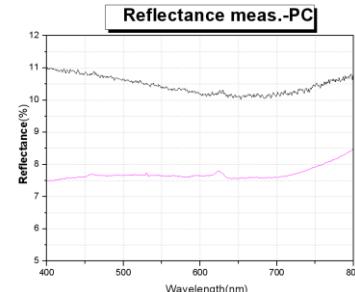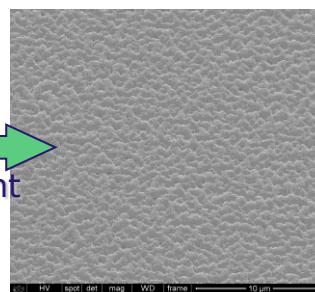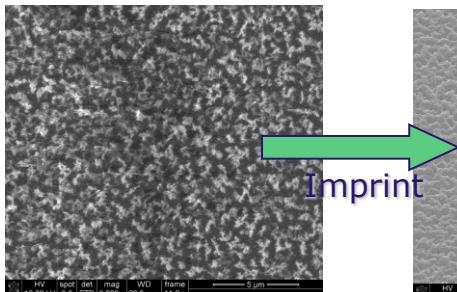
KIMM

Thank You !

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