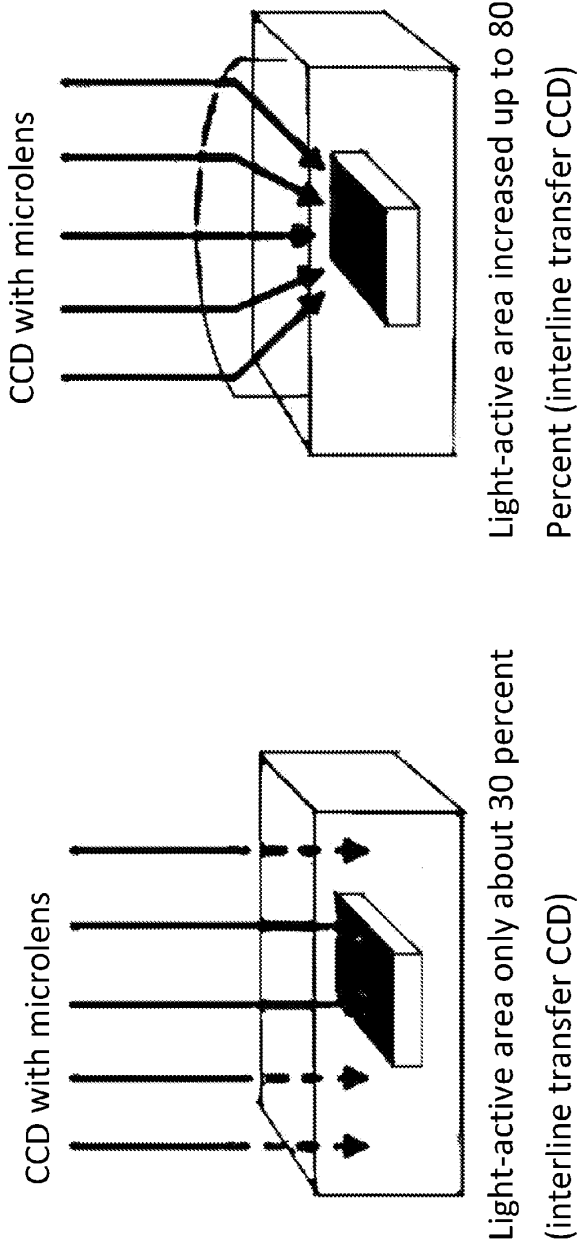
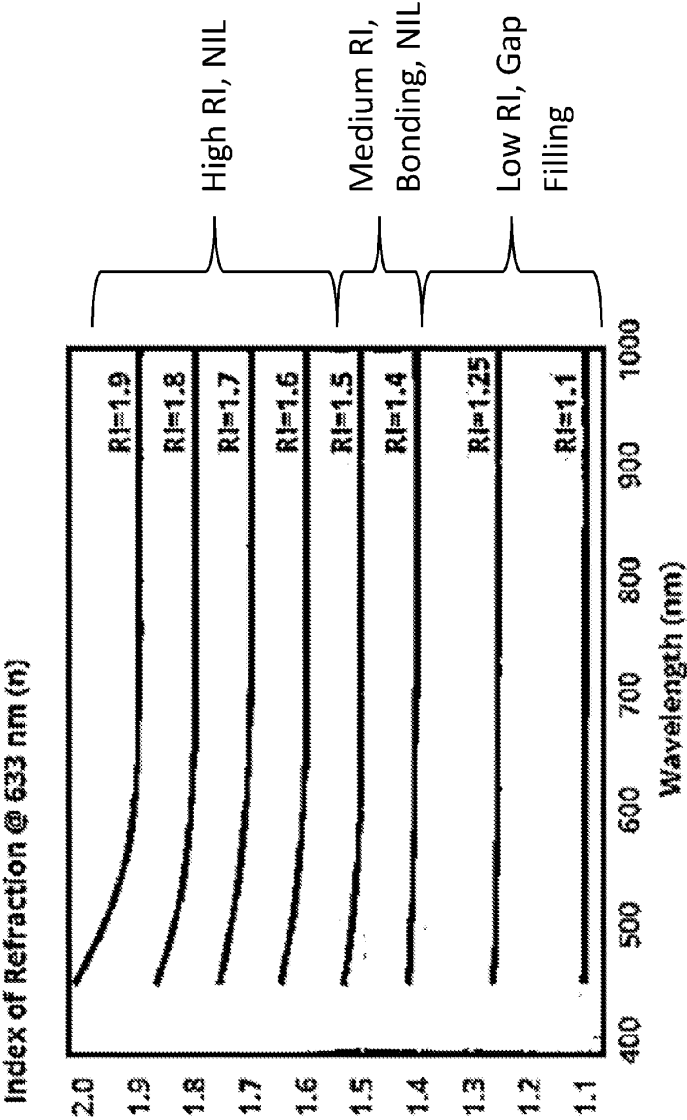


FIG. 1A

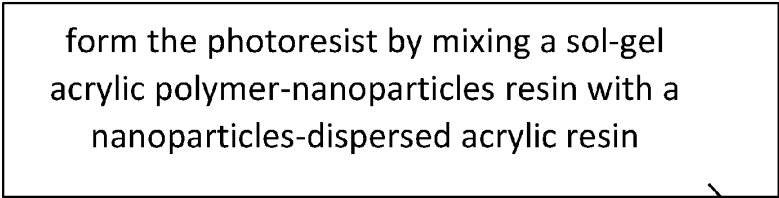


PRIOR ART

FIG. 1B



PRIOR ART

FIG. 2

form the photoresist by mixing a sol-gel
acrylic polymer-nanoparticles resin with a
nanoparticles-dispersed acrylic resin

202

FIG. 3

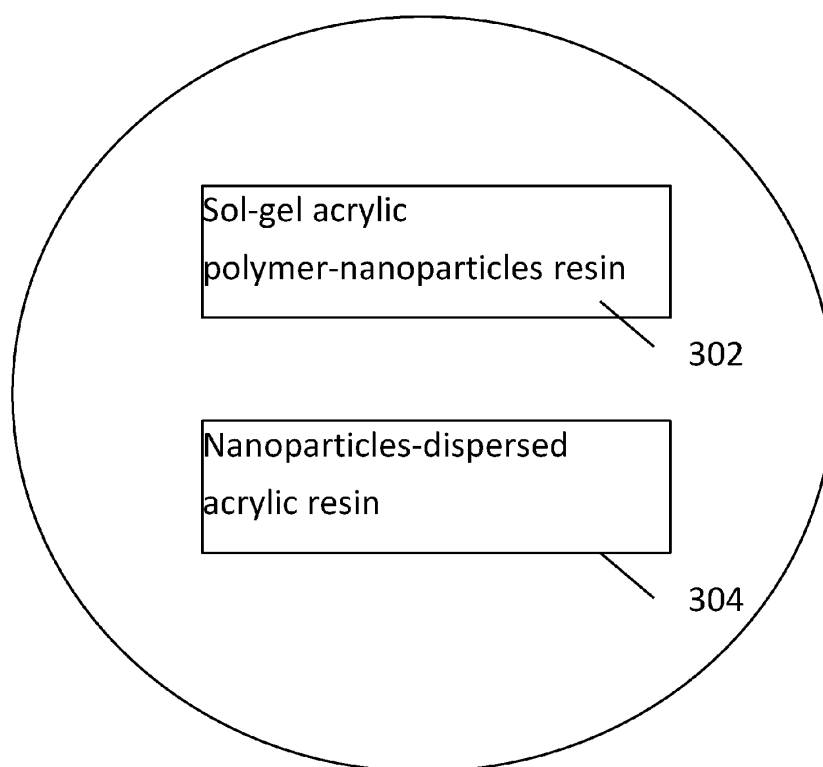


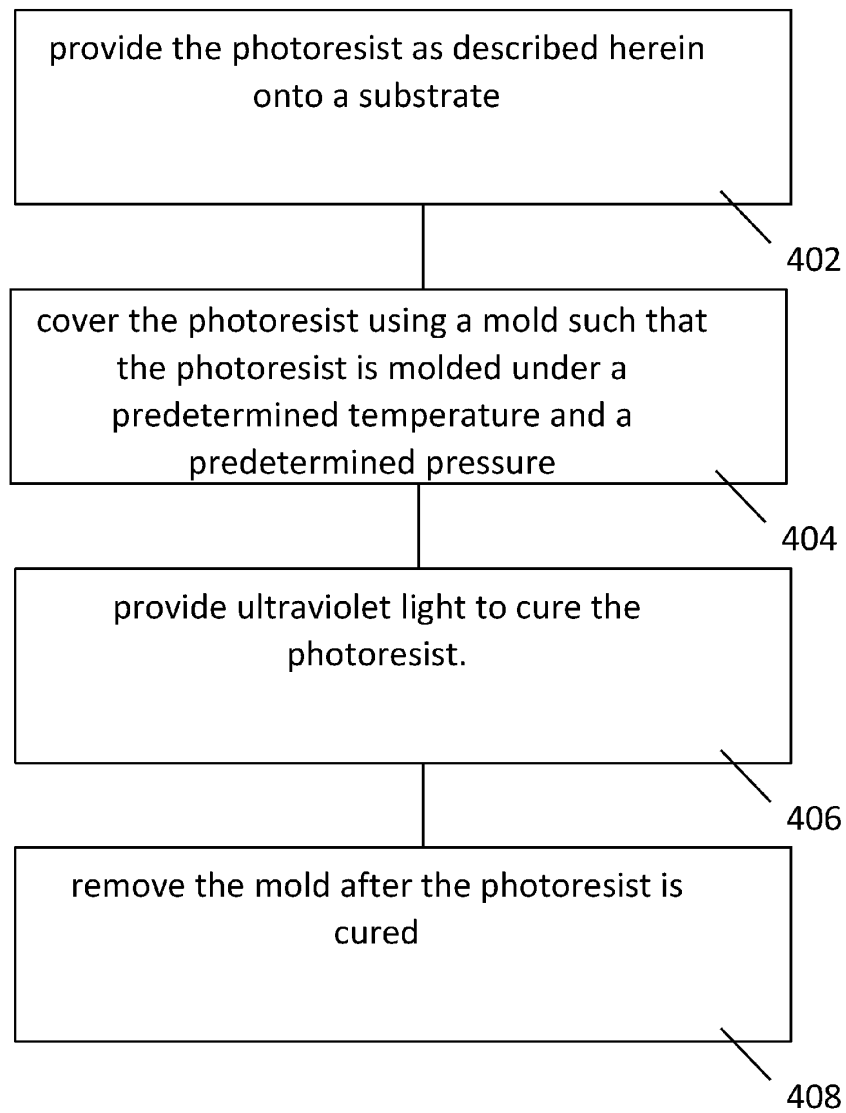
FIG. 4

FIG. 5A

Sample	methyl methacrylate (MMA)	pentabromobenzyl methacrylate (BMA)	titanium isopropoxide (TI)	trimethoxy(7-octen-1-yl)silane (TS)	poly(ethylene glycol dimethacrylate) (PEGD)	diacetoxyphenylacetophenone (DPAP)	temperature	mixing time
PMMA-TiO2-64.6%	0.5 ml	0	3.5 ml	0.5 ml	0.5 ml	50 mg	25 °C	5 hours

FIG. 5B

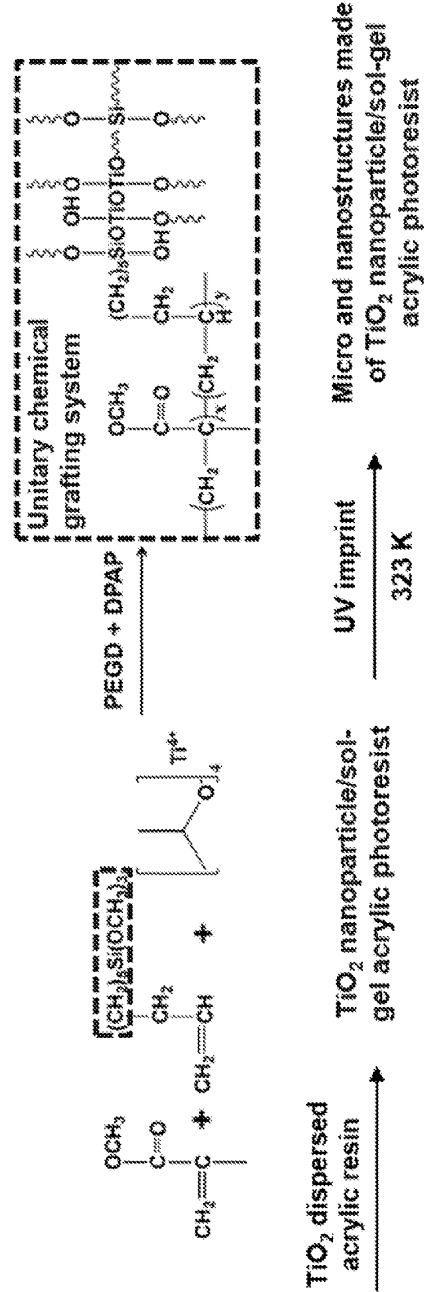


FIG. 6A

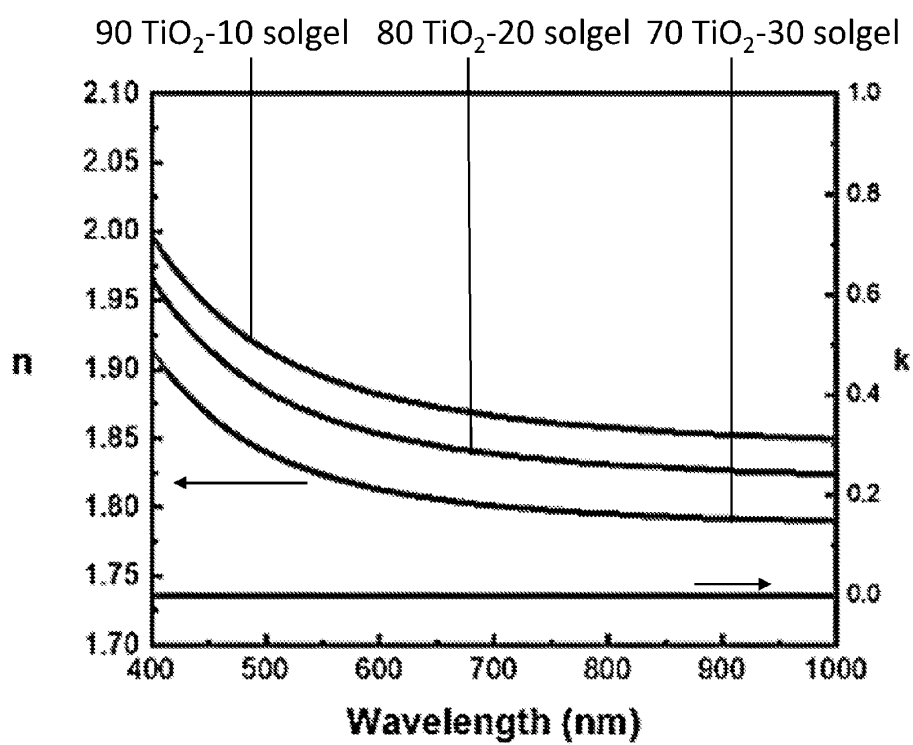


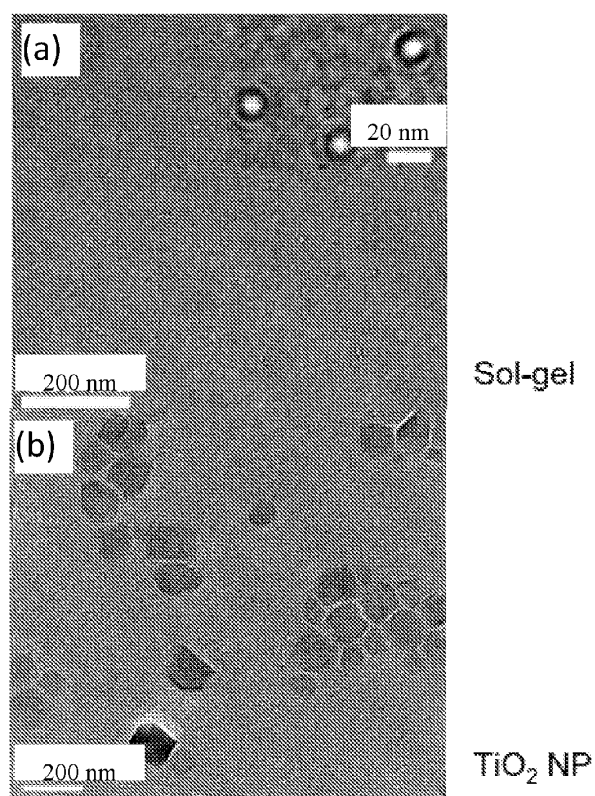
FIG. 6B

FIG. 7

Nanoimprint stage	Set Pressure	Set Temperature	Thermal Pressing And Holding Time	UV-NIL Exposure Duration	Demold Temperature	UV Wavelength
i	Afm. pressure	50 °C	120 s	N.A.	Room temperature (25 ... 30 °C)	365 nm
li	Afm. pressure	50 °C	N.A.	6 mins (with 6s 'on' and 6s 'off' cycle)	Room temperature (25 ... 30 °C)	365 nm

FIG. 8

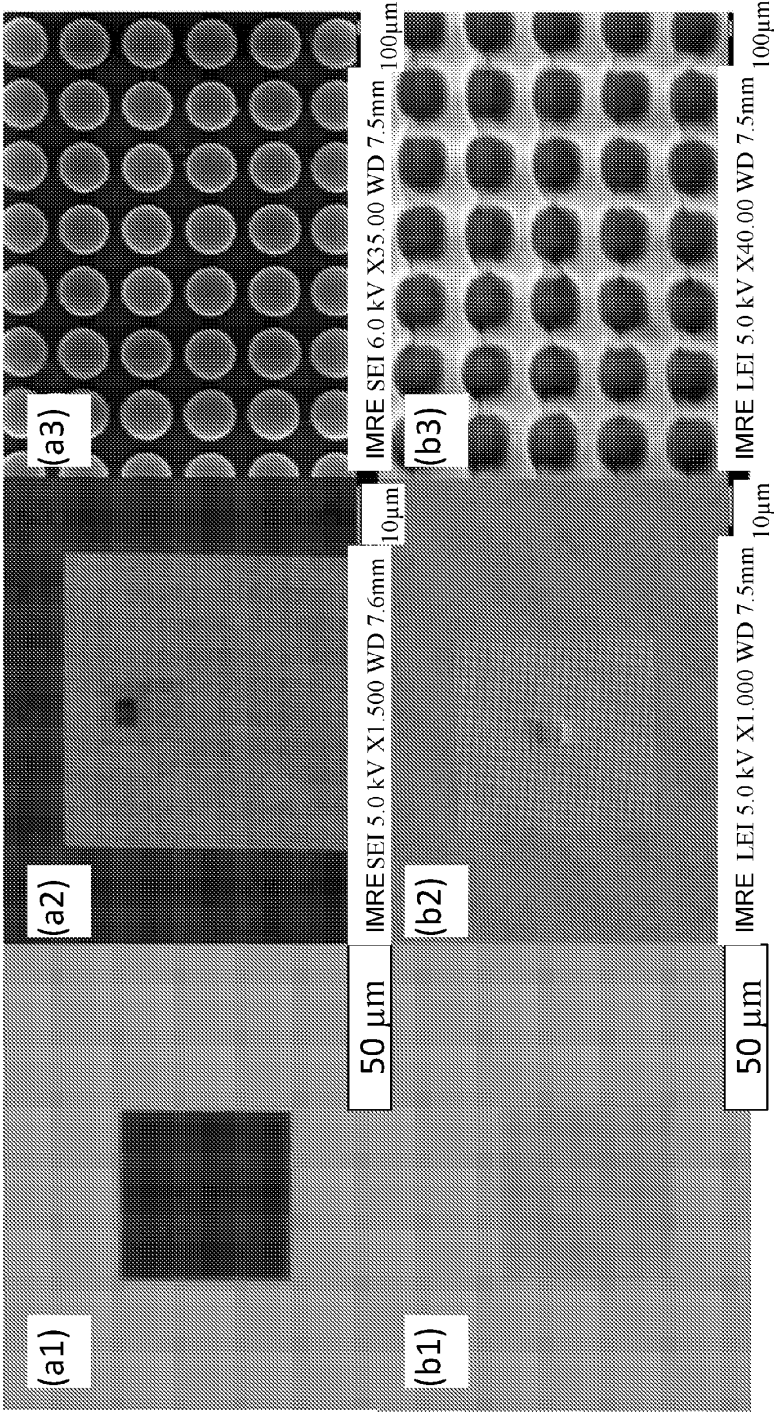


FIG. 9

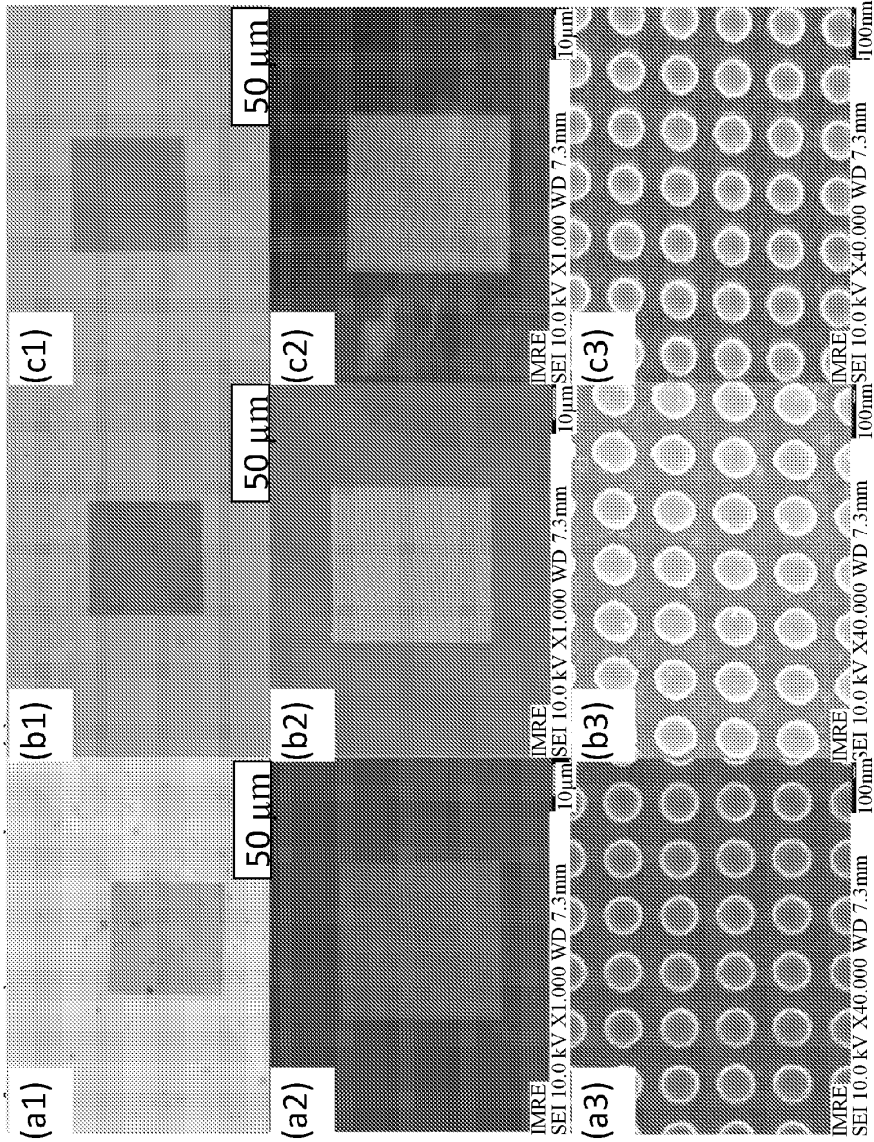


FIG. 10

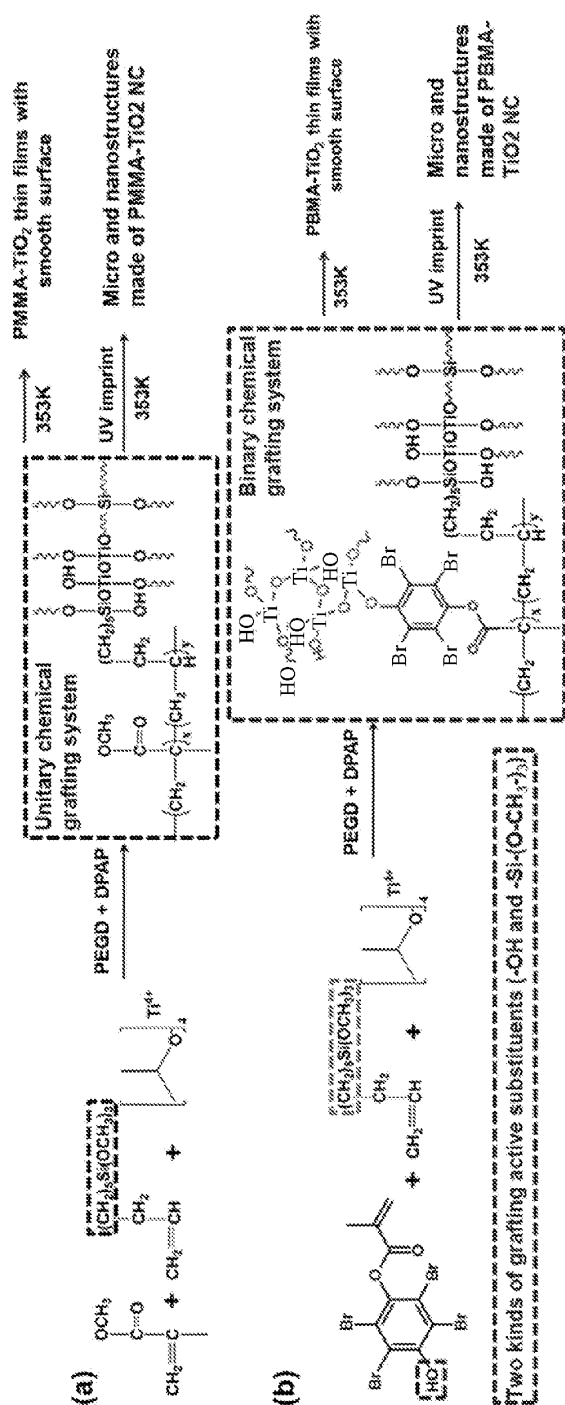


FIG. 11A

Sample	methyl methacrylate (MMA)	pentabromobenzyl methacrylate (BMA)	titanium isopropoxide (TI)	trimethoxy(7-octen-1-yl)silane (TS)	poly(ethylene glycol dimethacrylate) (PEGD)	dimethoxyphenylacetophenone (DPAP)	Temperature	Mixing time
PMMA-TiO ₂ -64.6%	0.5 ml	0	3.5 ml	0.5 ml	0.5 ml	50 mg	25 °C	5 h
PBMA-TiO ₂ -69.2%	0	0.5 ml	3.5 ml	0.5 ml	0.5 ml	50 mg	25 °C	5 h

FIG. 11B

Nanoimprint stage	Set Pressure	Set Temperature	Thermal NIL holding time	UV exposure duration	Demold temperature	UV Wavelength
i	10 bar	80 °C	120 s	N.A.	Room temperature (25-30 °C)	365 nm
ii	atm pressure	Room temperature (25-30 °C)	N.A.	5 mins (with 5s 'on' and 5s 'off' cycle)	Room temperature (25-30 °C)	365 nm

FIG. 12

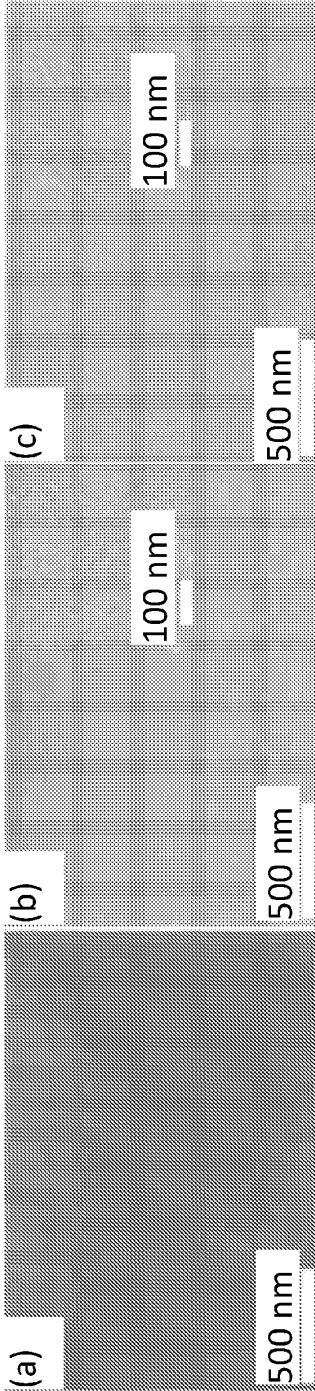


FIG. 13A

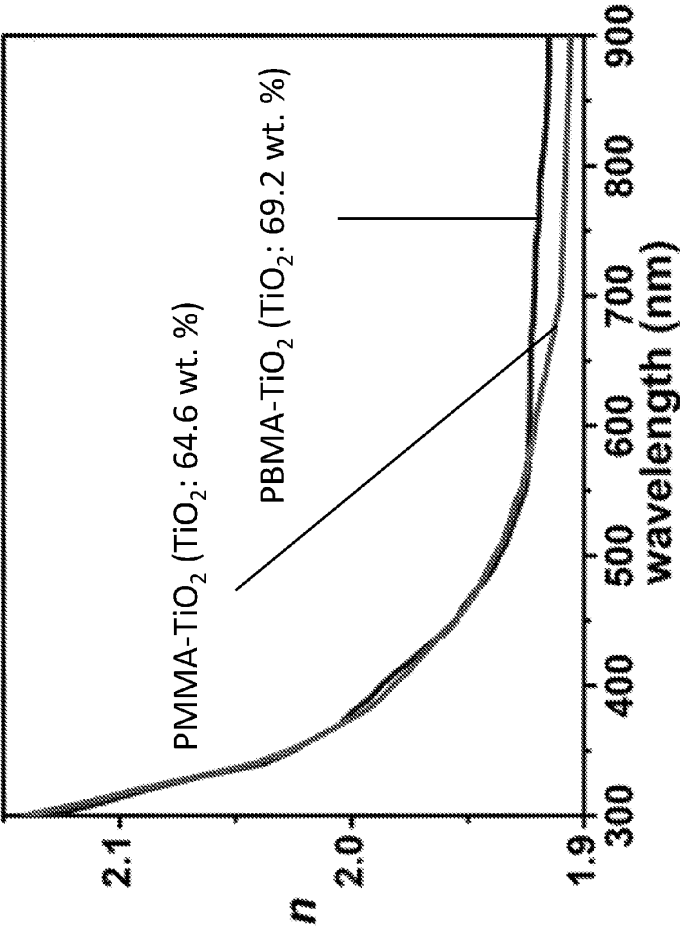


FIG. 13B

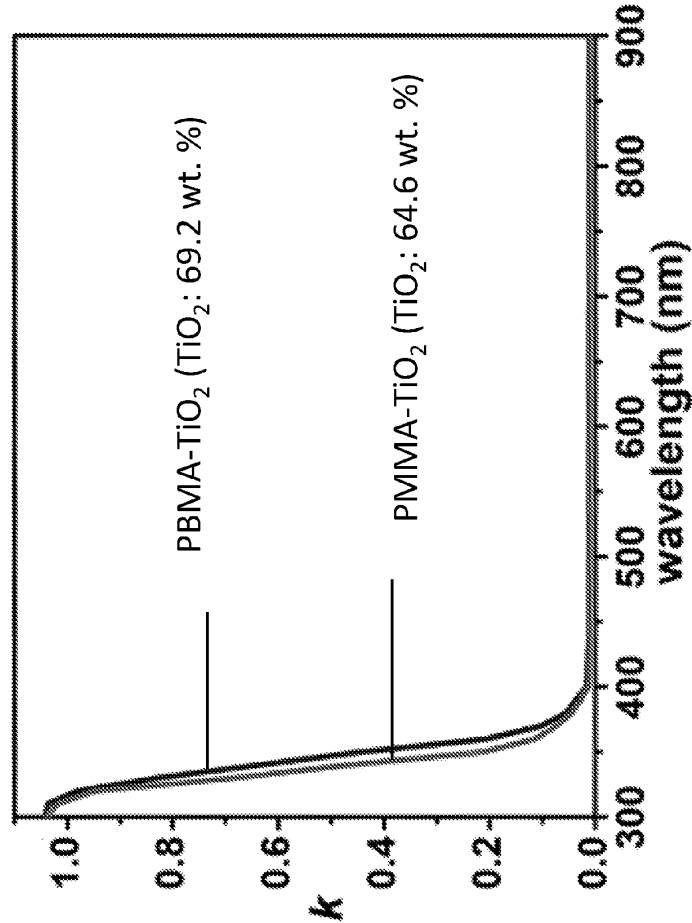


FIG. 13C

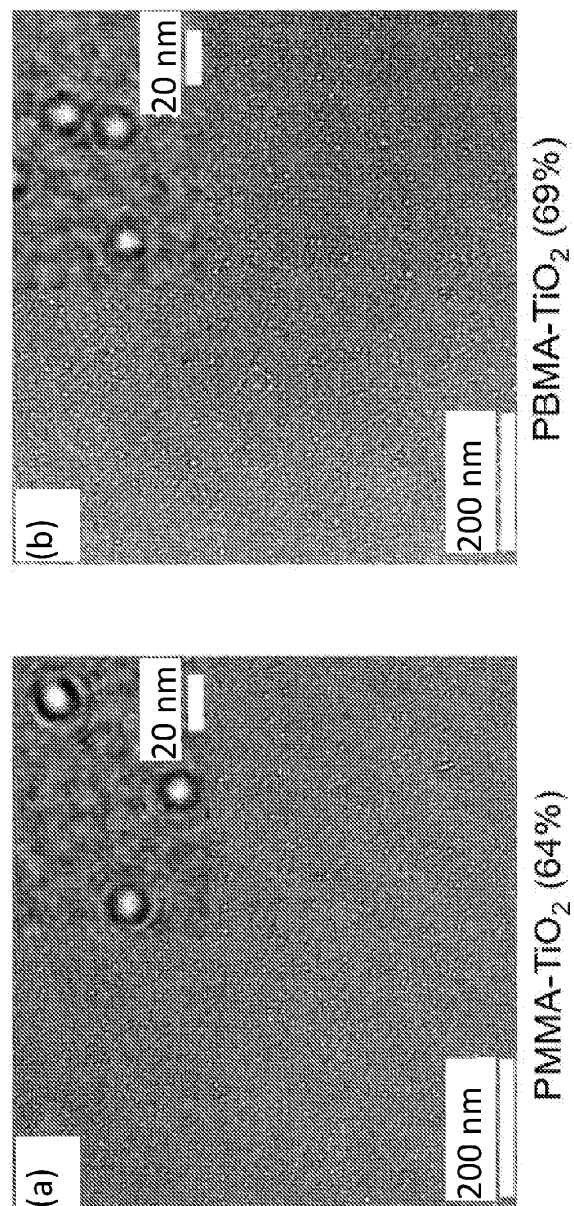


FIG. 14

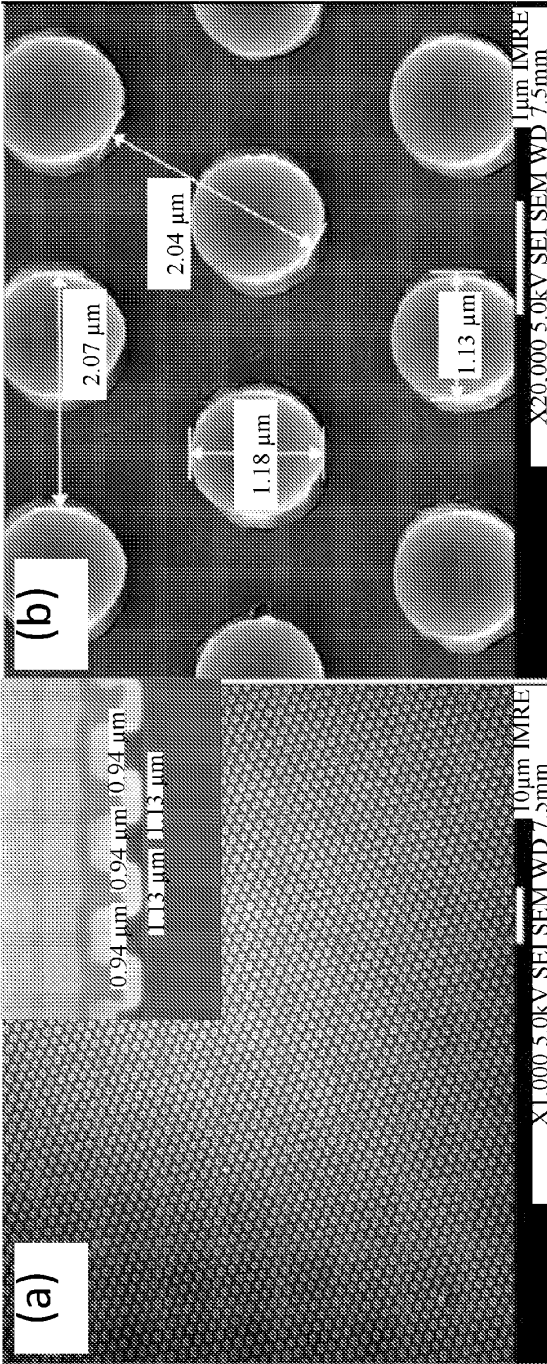


FIG. 15

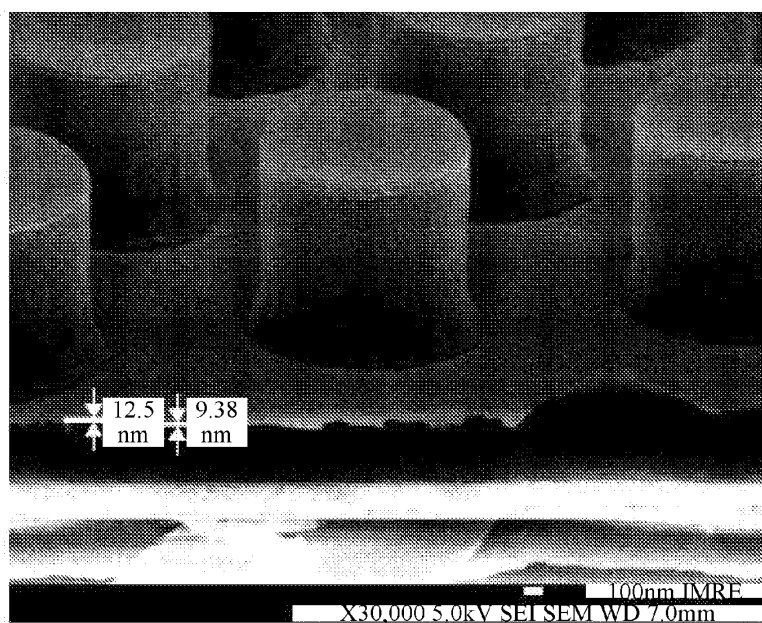


FIG. 16

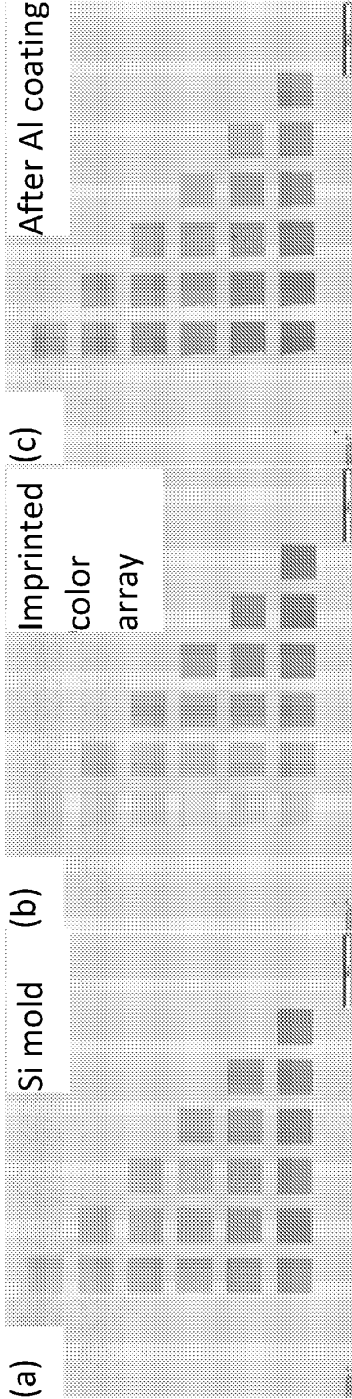


FIG. 17

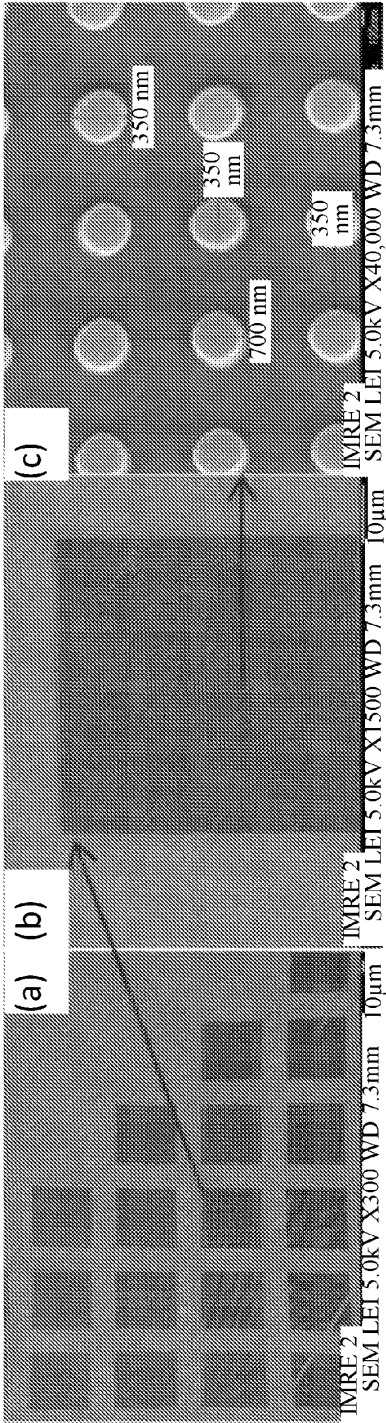


FIG. 18

Property	Embodiment	Conventional resist 1	Conventional resist 2	Conventional resist 3
Refraction index at 589 nm	1.93	1.85	1.57	1.94
Thickness at 1000 rpm	0.5 μm	0.5 μm	10 – 100 μm	-
Transmittance 420 nm	> 80%	> 95%	> 80%	> 63%
Imprint quality	High fidelity of pattern transfer	-	-	Non-uniformity
Solvent	Not required	Required	Required	Required (methyl isobutyl ketone)