

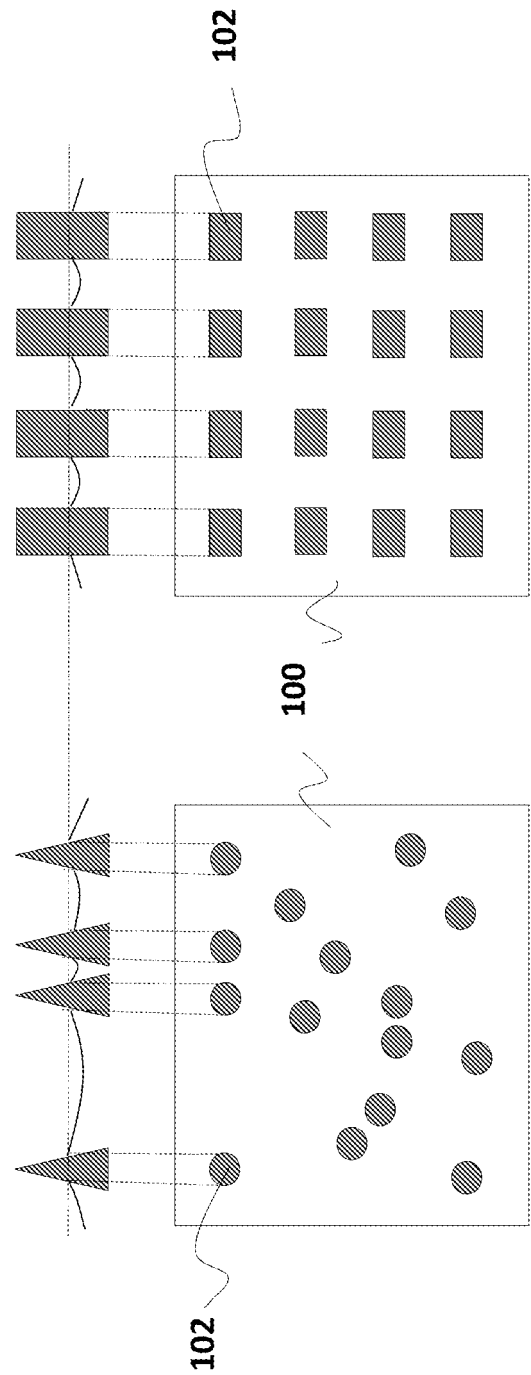


FIG. 1

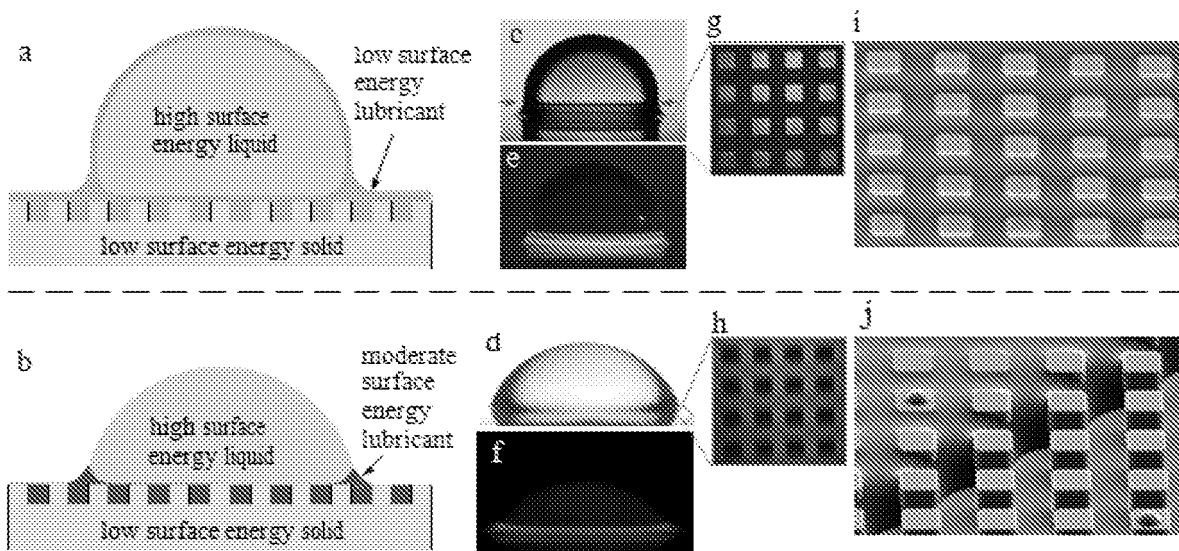


FIG. 1(a) – (j)

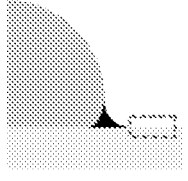
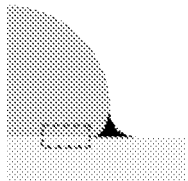
Interface	Configuration	Total interface energy per unit area	Equivalent Criteria
 Oil-Solid-Air	<i>A1</i> Dry 	$E_{A1} = r \gamma_{sa}$	$E_{A1} < E_{A2}, E_{A3}$ $S_{oil(s)} < -\gamma_{sa} \left(\frac{r-1}{r} \right)$ $\theta_{oil(s)} > \theta^*$
	<i>A2</i> Impregnated, emerged 	$E_{A2} = (r-\phi)\gamma_{sa} + \phi \gamma_{so} + (1-\phi)\gamma_{os}$	$E_{A2} < E_{A1}, E_{A3}$ $-\gamma_{sa} \left(\frac{r-1}{r} \right) < S_{oil(s)} < 0$ $0 < \theta_{oil(s)} < \theta^*$
	<i>A3</i> Encapsulated 	$E_{A3} = \gamma_{sa} + r \gamma_{os}$	$E_{A1} < E_{A2}, E_{A3}$ $S_{oil(s)} \geq 0$ $\theta_{oil(s)} = 0$
 Oil-Solid-Water	<i>W1</i> Impaled 	$E_{W1} = r \gamma_{sw}$	$E_{W1} < E_{W2}, E_{W3}$ $S_{oil(s)} < -\gamma_{sw} \left(\frac{r-1}{r} \right)$ $\theta_{oil(s)} > \theta^*$
	<i>W2</i> Impregnated, emerged 	$E_{W2} = (r-\phi)\gamma_{sw} + \phi \gamma_{so} + (1-\phi)\gamma_{os}$	$E_{W2} < E_{W1}, E_{W3}$ $-\gamma_{sw} \left(\frac{r-1}{r} \right) < S_{oil(s)} < 0$ $0 < \theta_{oil(s)} < \theta^*$
	<i>W3</i> Encapsulated 	$E_{W3} = \gamma_{sw} + r \gamma_{os}$	$E_{W3} < E_{W1}, E_{W2}$ $S_{oil(s)} \geq 0$ $\theta_{oil(s)} = 0$

FIG. 1(k)

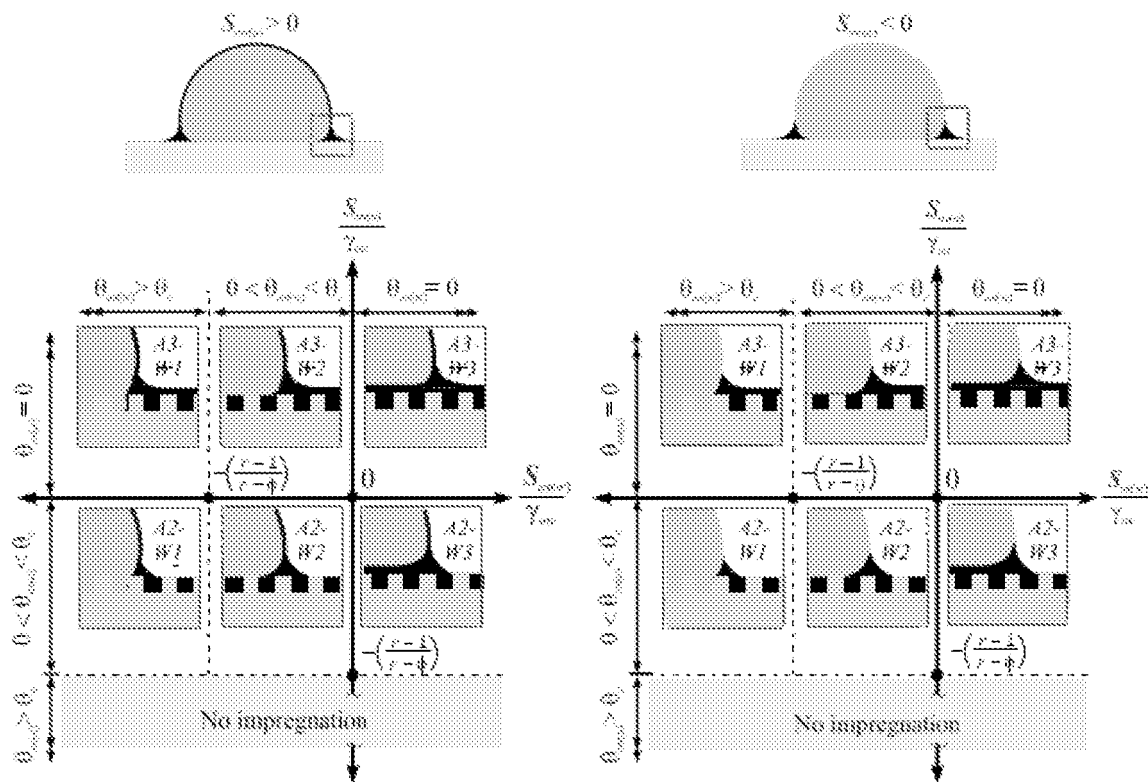


FIG. 2

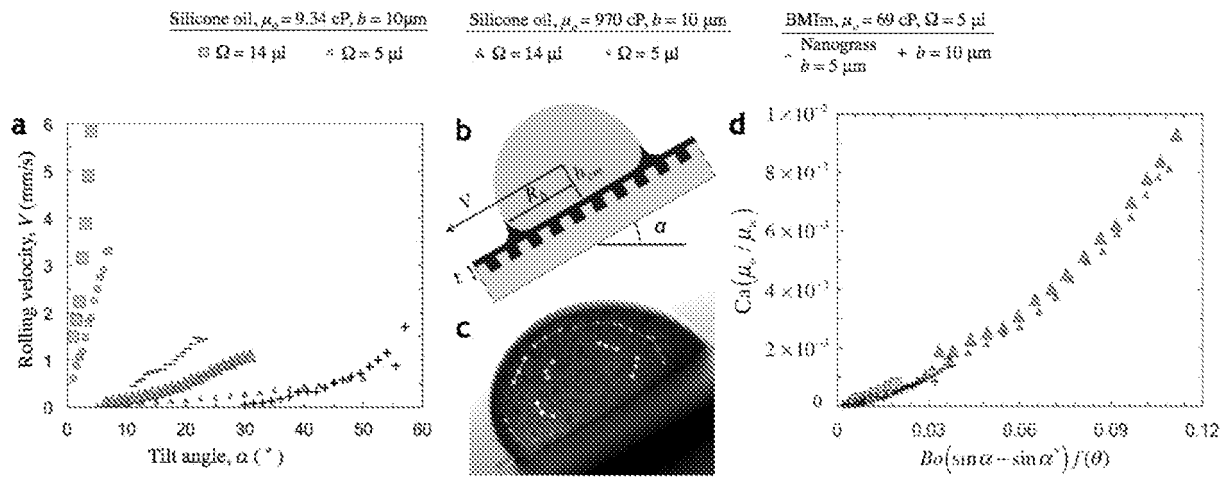
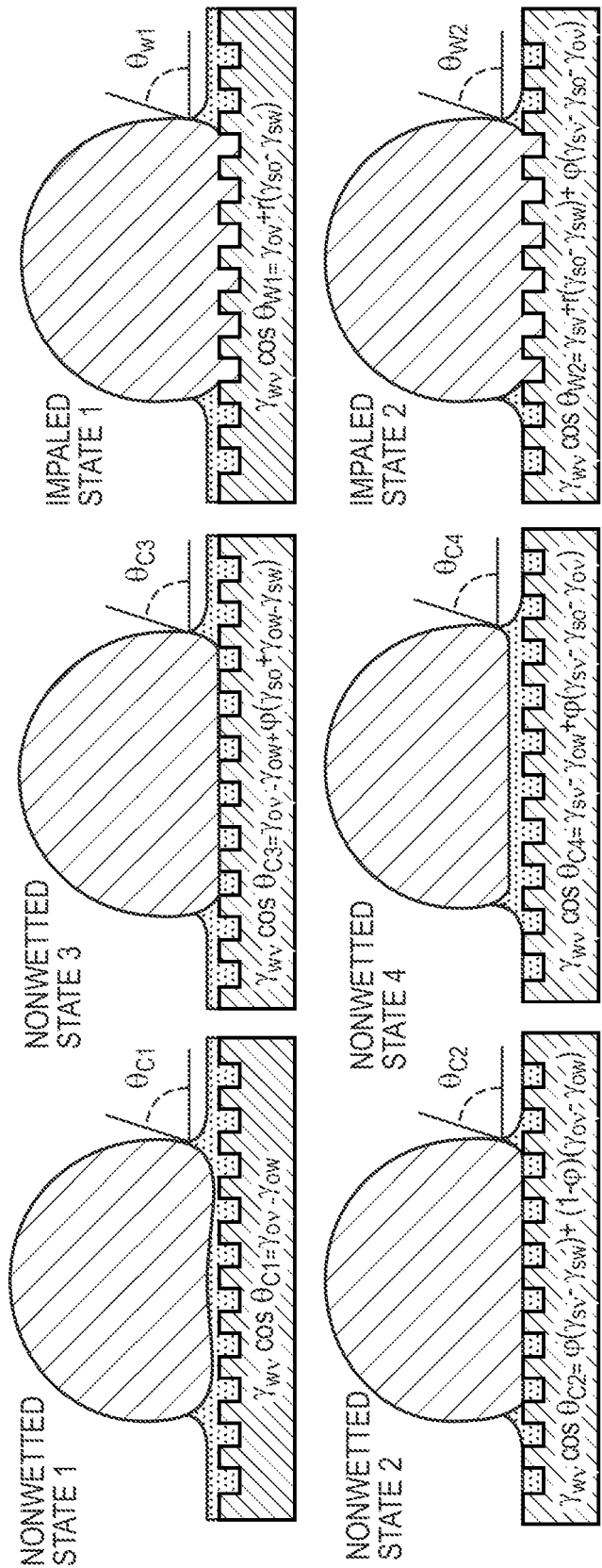


FIG. 3(a) – (d)

LIQUID-IMPREGNATED SURFACE WETTING STATES



STABLE WETTING STATE DETERMINED BY 4 WETTING CONDITIONS

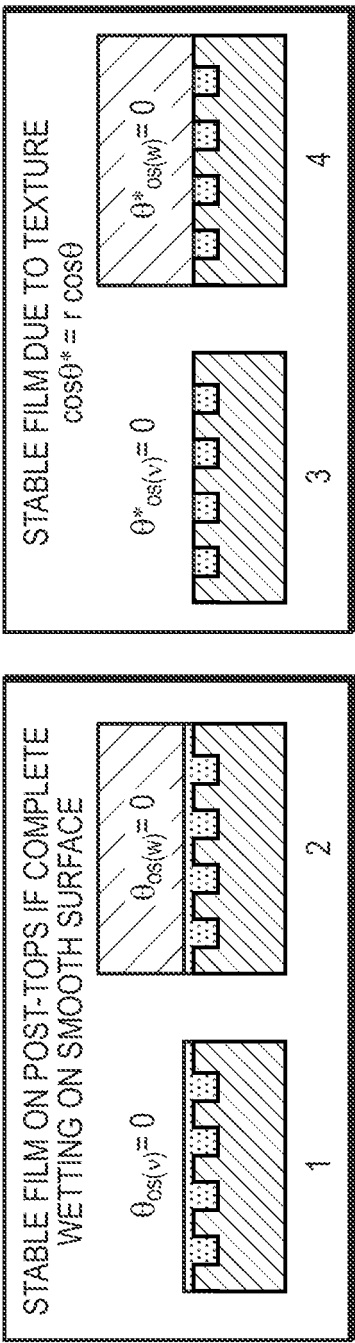


FIG. 4

EQUATIONS ENLARGED FOR CLARITY

NONWETTED
STATE 1

$$\theta_{os(v)}^* = 0$$

$$\theta_{os(w)}^* = 0$$

$$\theta_{os(v)} = 0$$

$$\theta_{os(w)} = 0$$

NONWETTED
STATE 3

$$\theta_{os(v)}^* = 0$$

$$\theta_{os(w)}^* = 0$$

$$\theta_{os(v)} = 0$$

$$\theta_{os(w)} > 0$$

IMPALED
STATE 1

$$\theta_{os(v)}^* = 0$$

$$\theta_{os(w)}^* > 0$$

$$\theta_{os(v)} = 0$$

$$\theta_{os(w)} > 0$$

NONWETTED
STATE 2

$$\theta_{os(v)}^* = 0$$

$$\theta_{os(w)}^* = 0$$

$$\theta_{os(v)} > 0$$

$$\theta_{os(w)} > 0$$

NONWETTED
STATE 4

$$\theta_{os(v)}^* = 0$$

$$\theta_{os(v)} > 0$$

$$\theta_{os(w)}^* = 0$$

$$\theta_{os(w)} = 0$$

IMPALED
STATE 2

$$\theta_{os(v)}^* = 0$$

$$\theta_{os(v)} > 0$$

$$\theta_{os(w)}^* > 0$$

$$\theta_{os(w)} > 0$$

FIG. 5

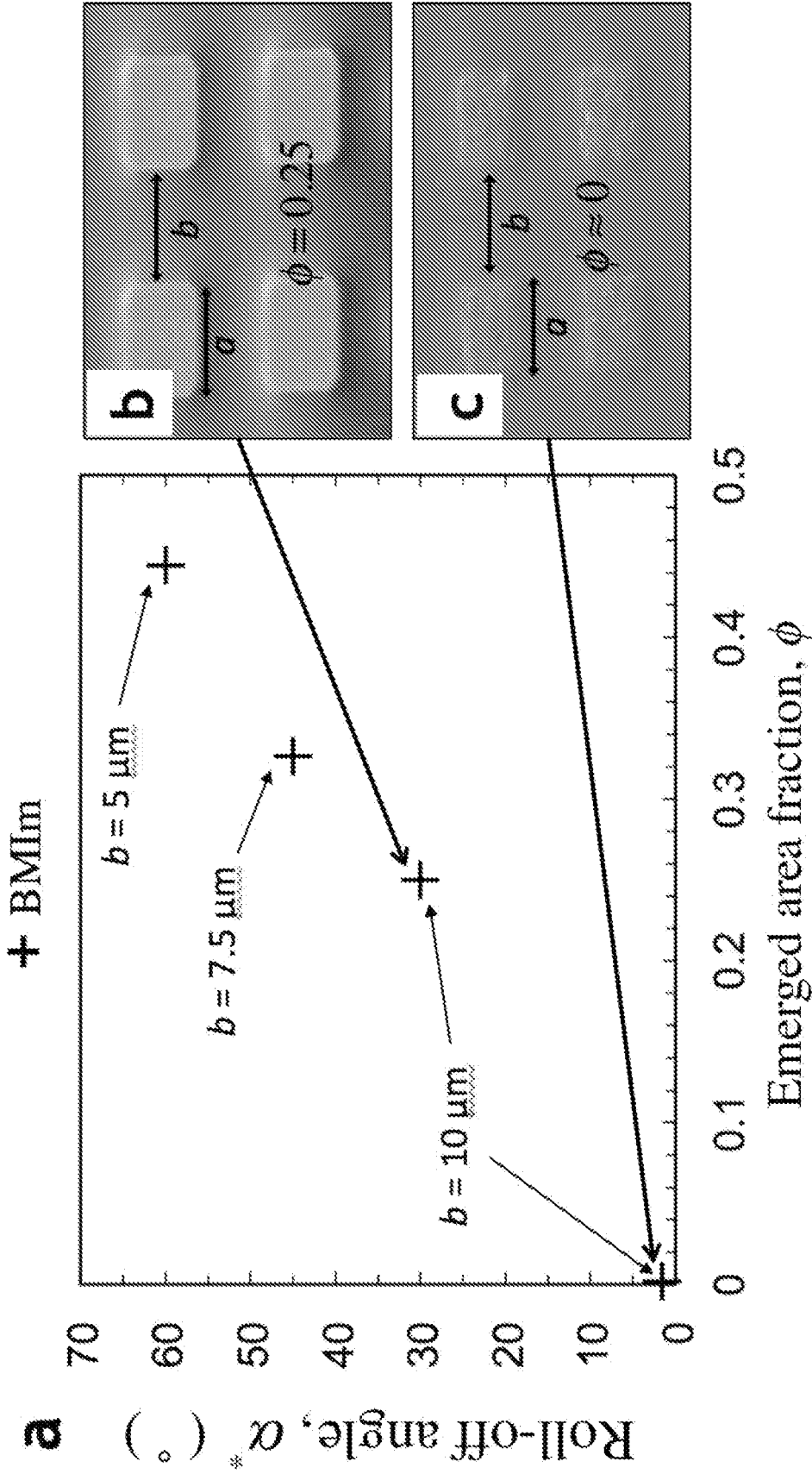


FIG. 6

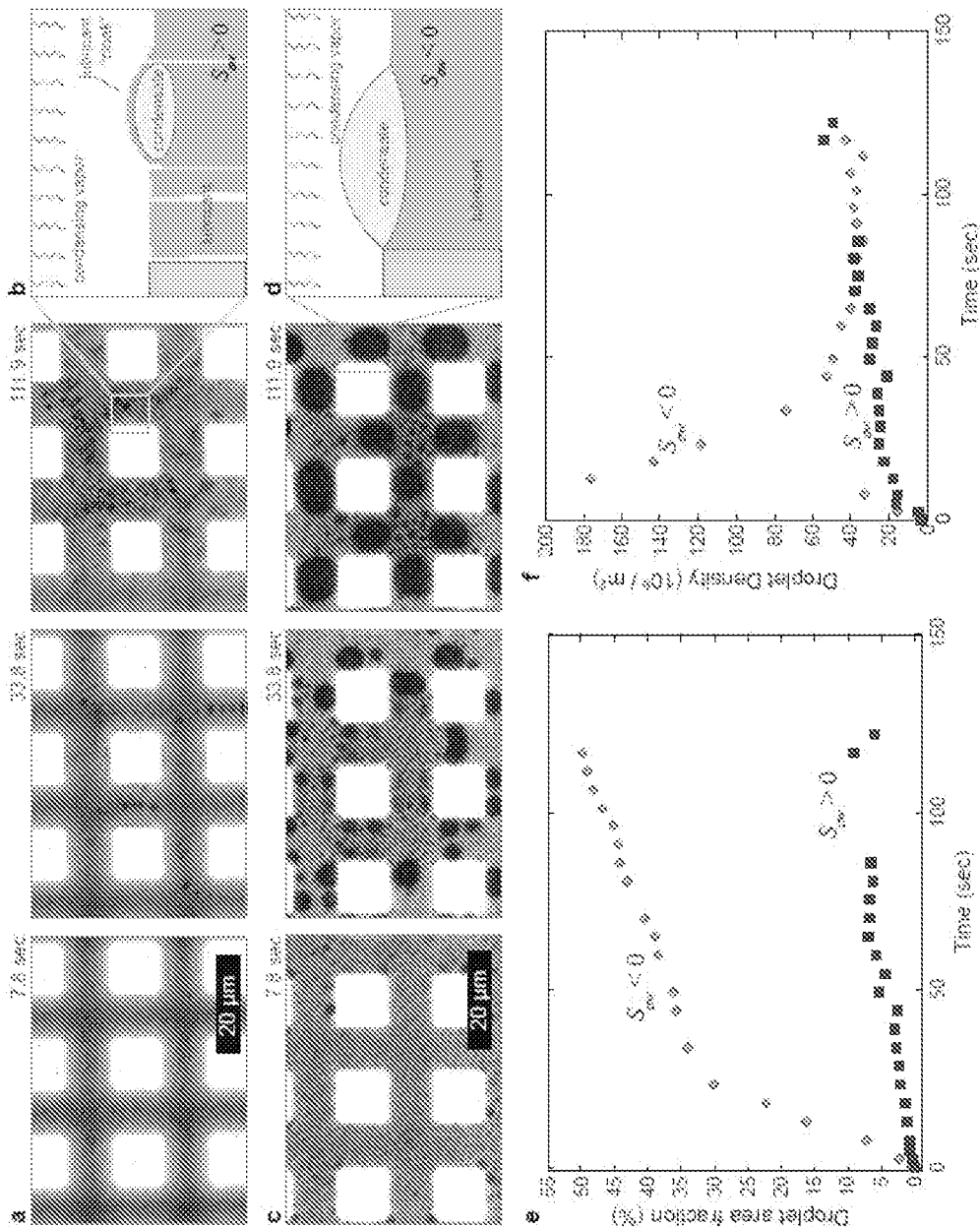


FIG. 7

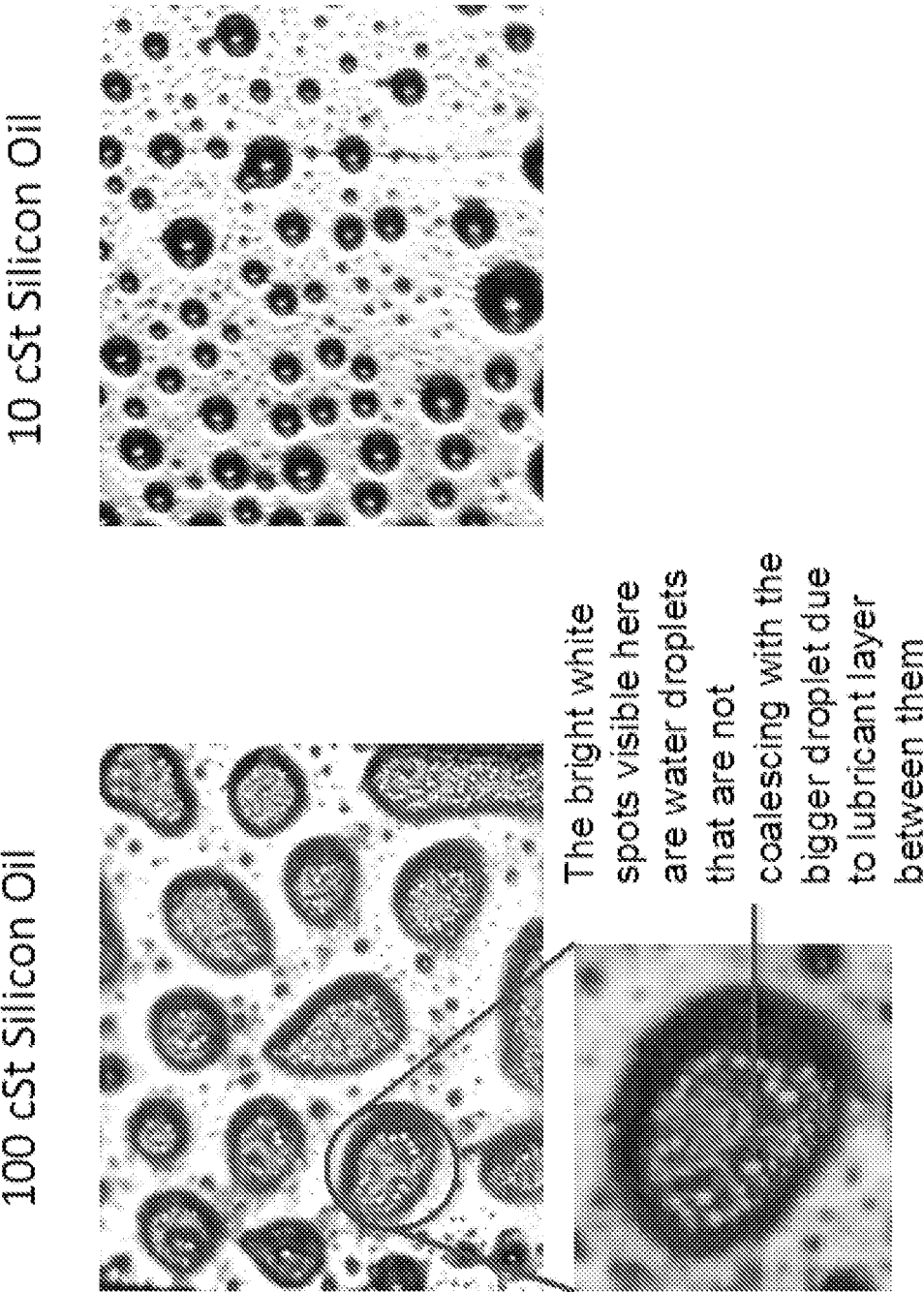


Fig. 8

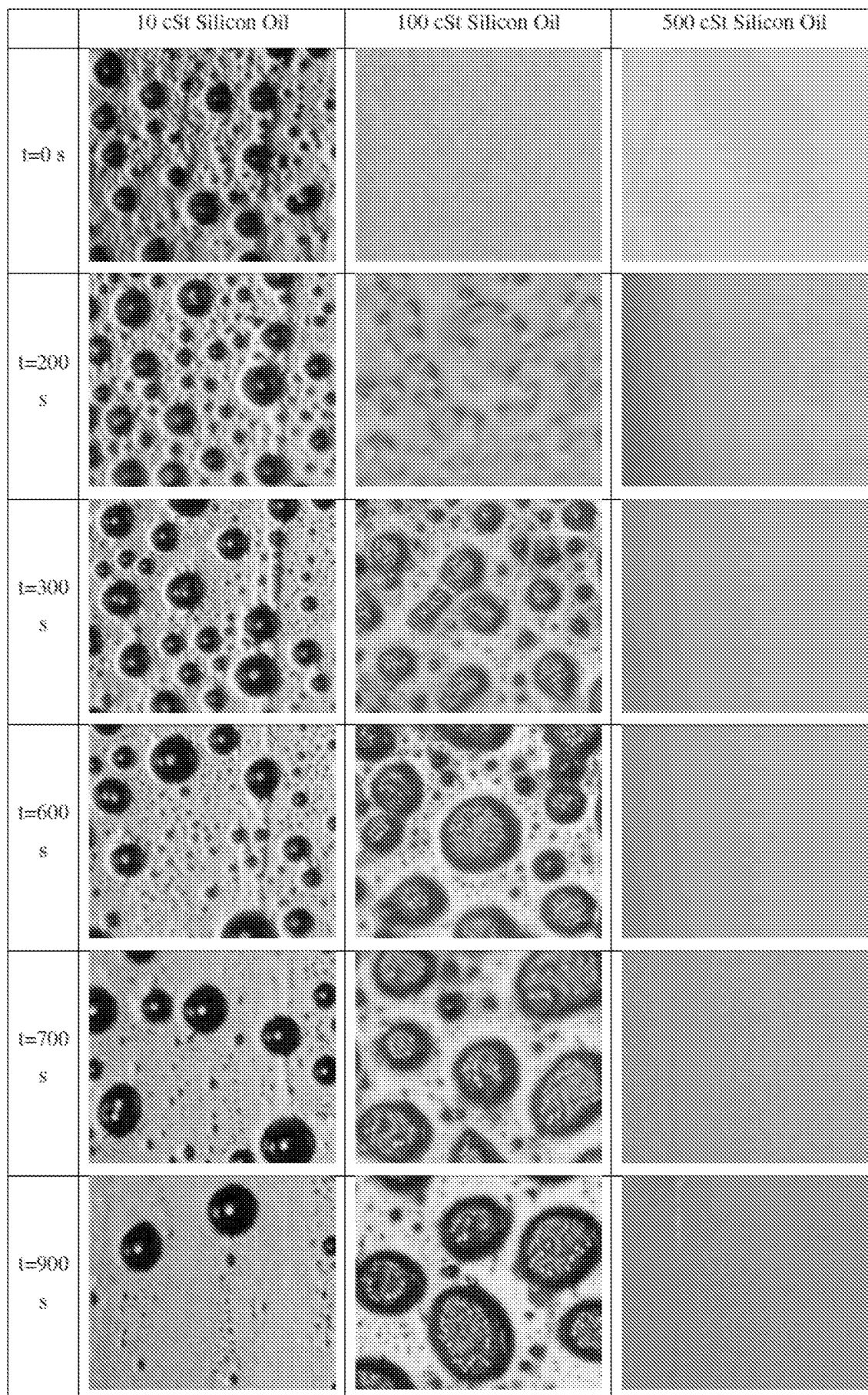


FIG. 9

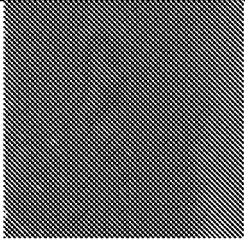
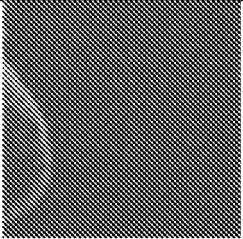
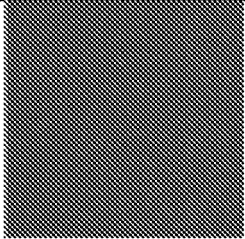
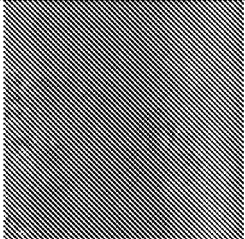
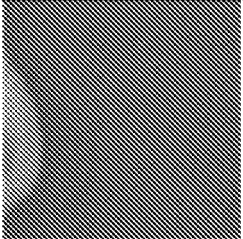
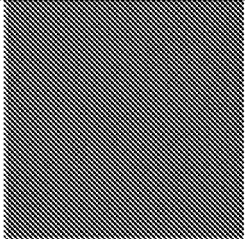
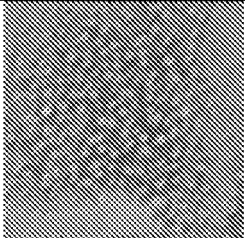
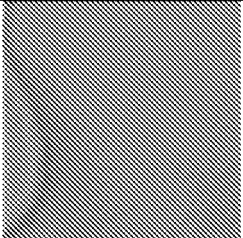
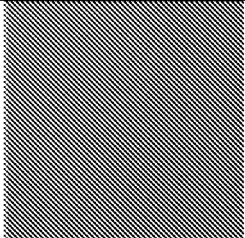
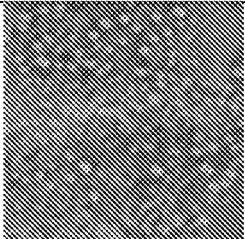
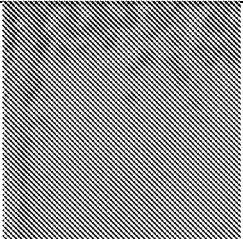
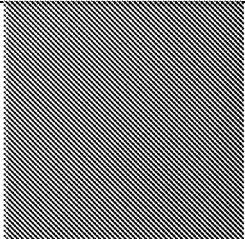
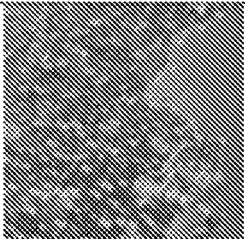
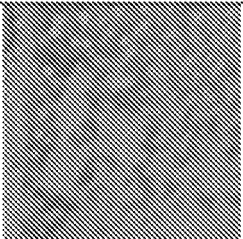
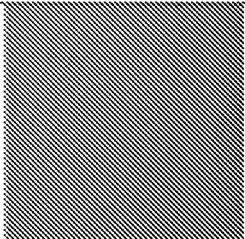
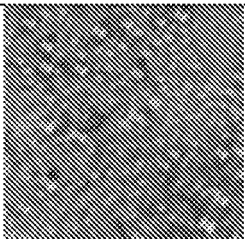
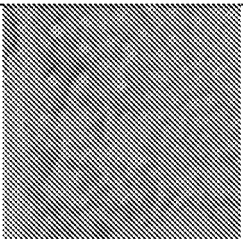
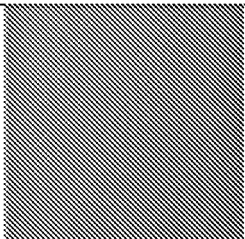
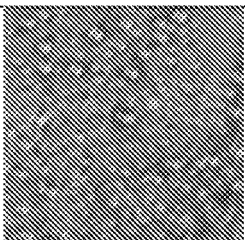
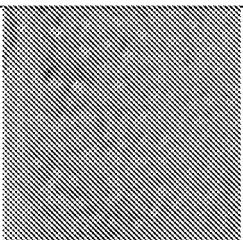
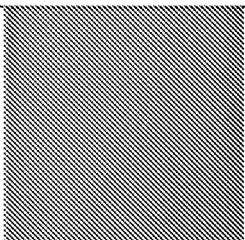
	10 cSt Silicon Oil	100 cSt Silicon Oil	500 cSt Silicon Oil
$t=0\text{ s}$			
$t=50\text{ s}$			
$t=150\text{ s}$			
$t=250\text{ s}$			
$t=450\text{ s}$			
$t=550\text{ s}$			
$t=750\text{ s}$			

FIG. 10

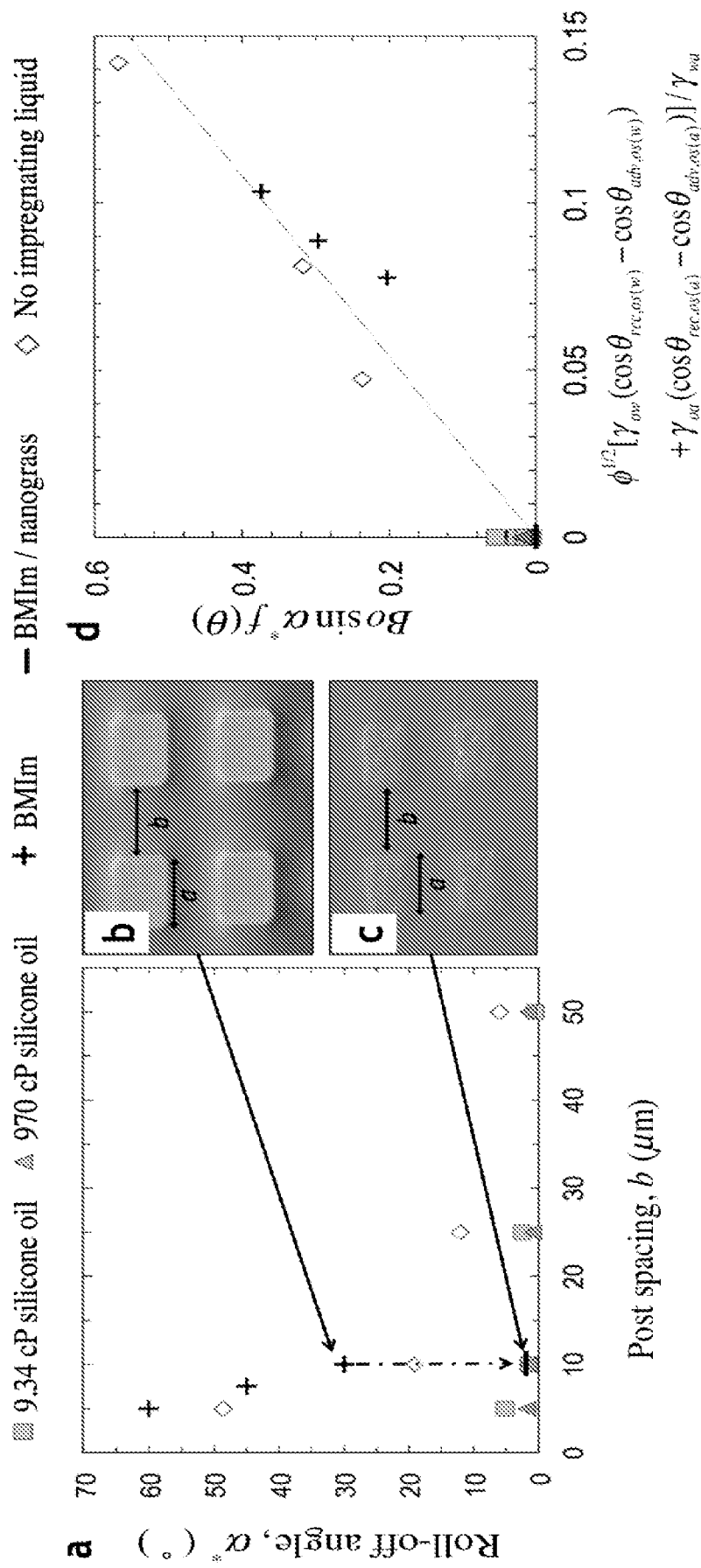


FIG. 11

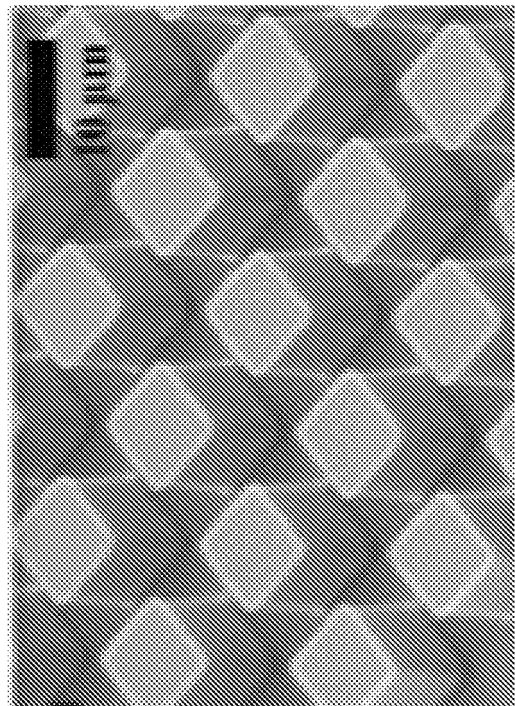


FIG. 12(a)

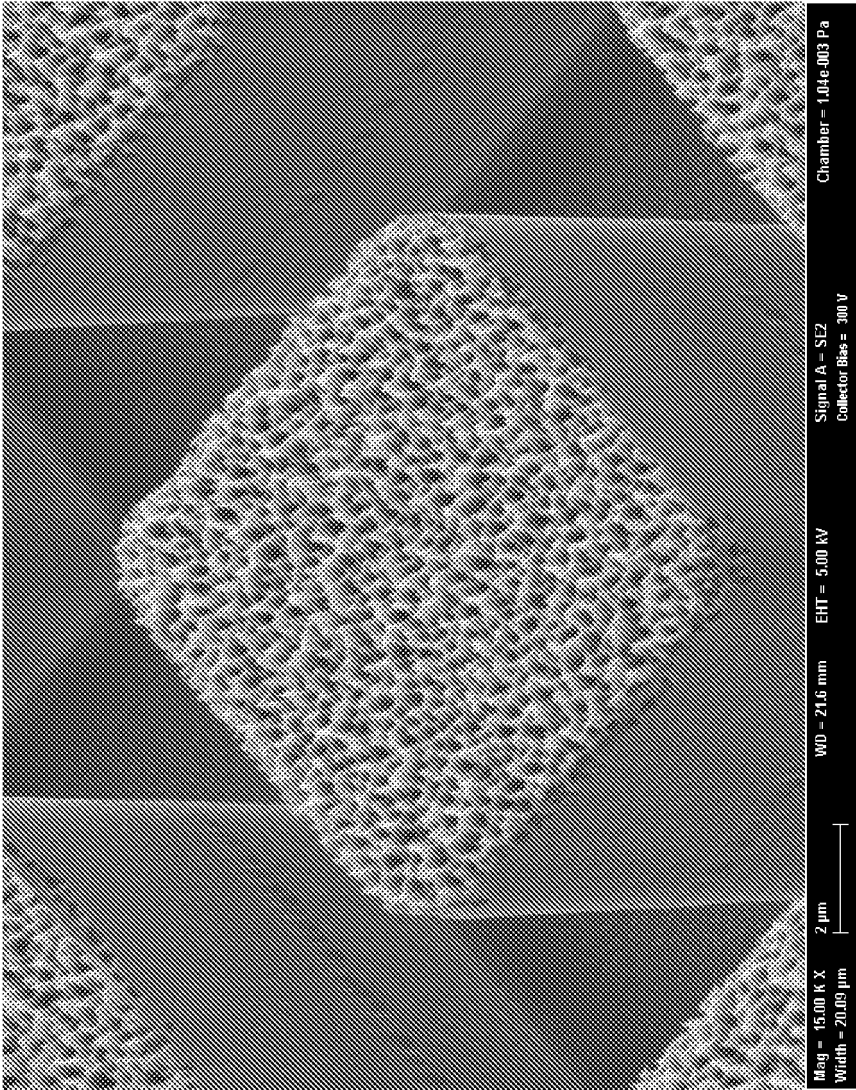
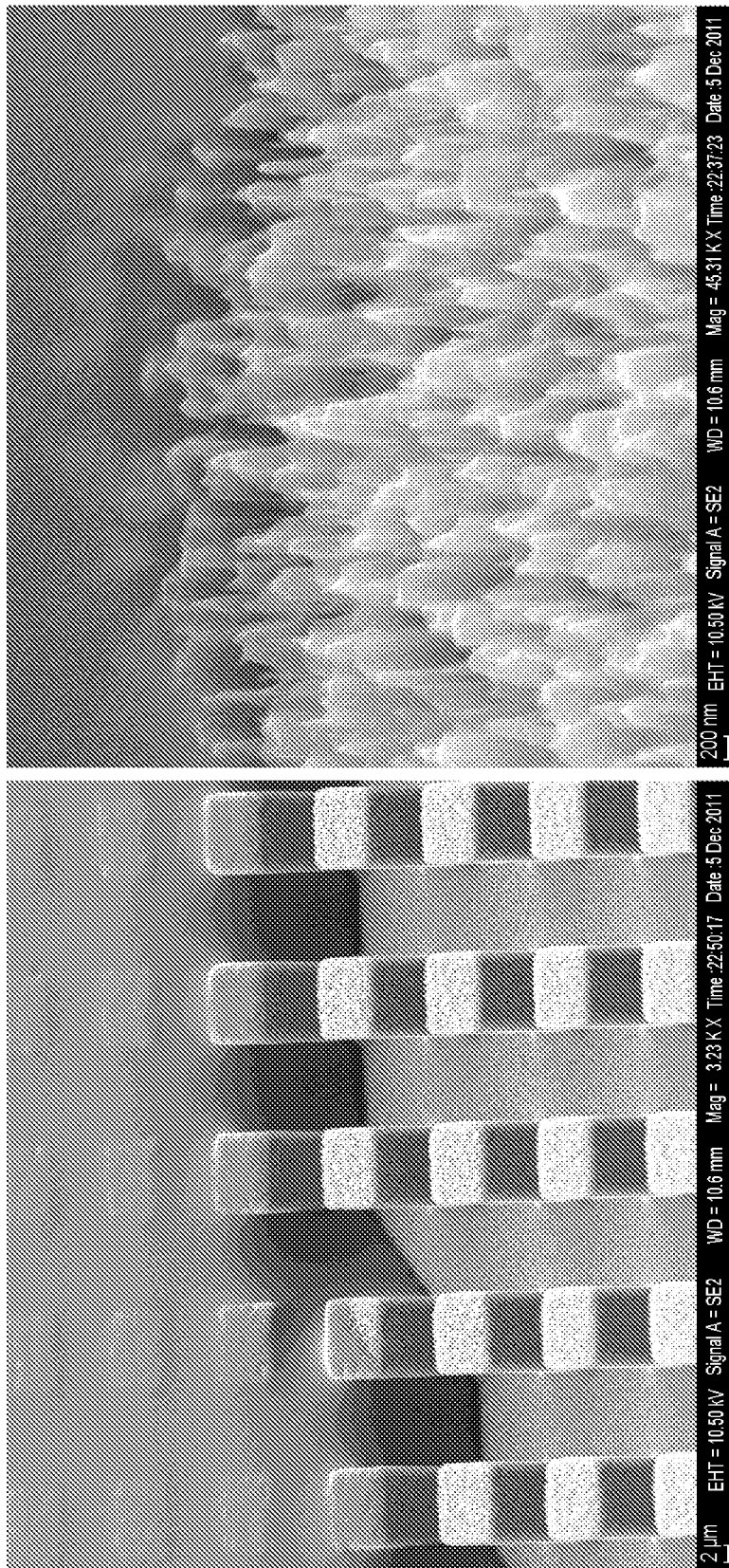


FIG. 12(b)

**FIG. 13**