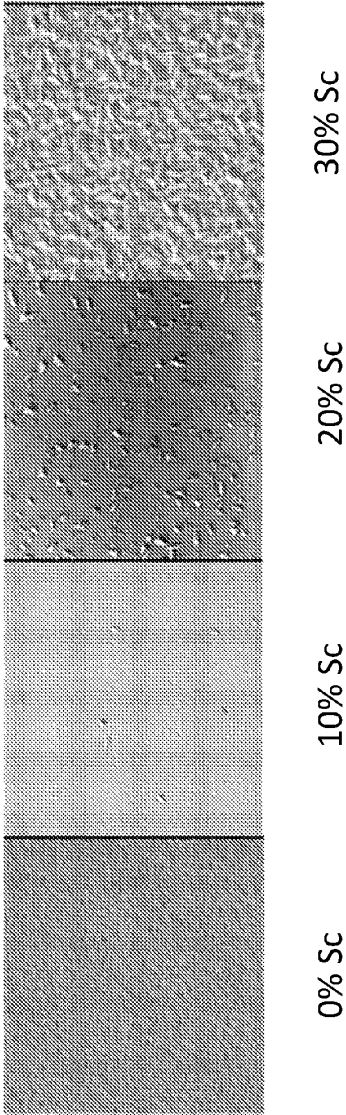


FIG. 1



PRIOR ART

FIG. 2A

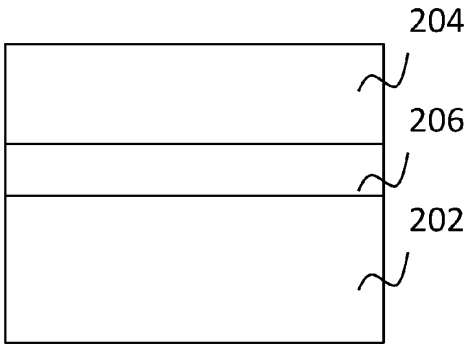


FIG. 2B

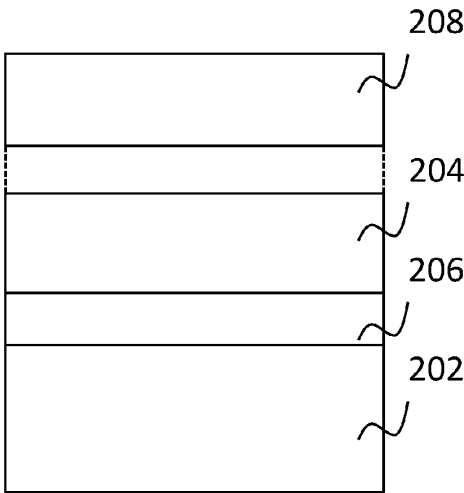


FIG. 3

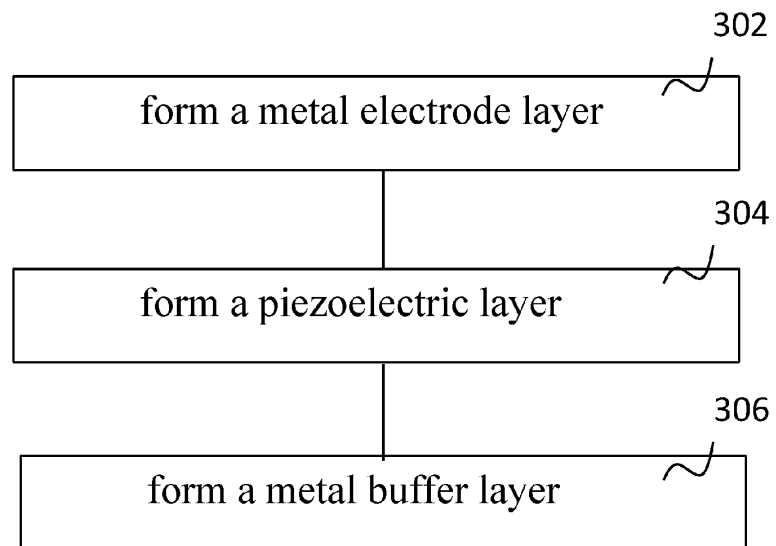
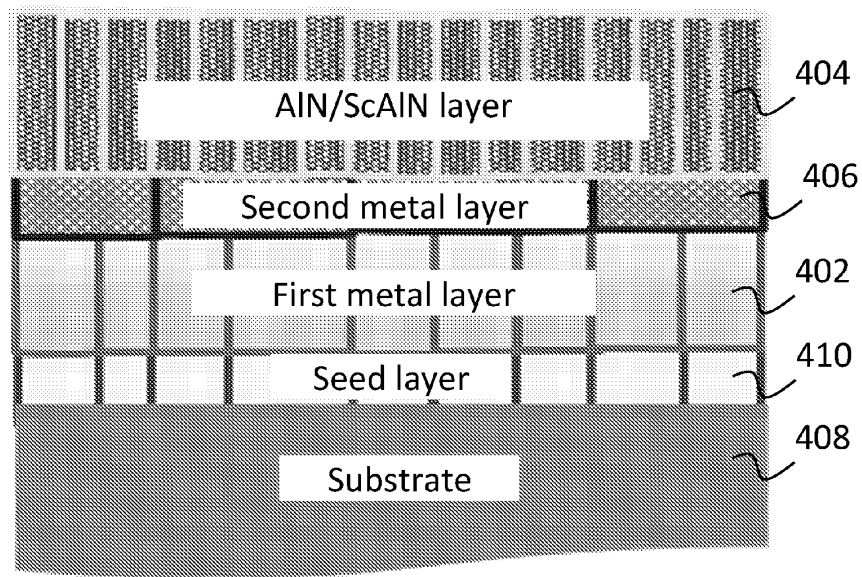
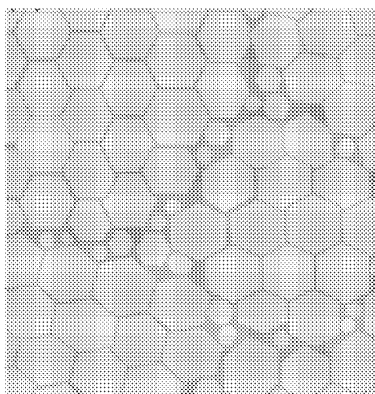


FIG. 4A



**FIG. 4B**



**FIG. 4C**

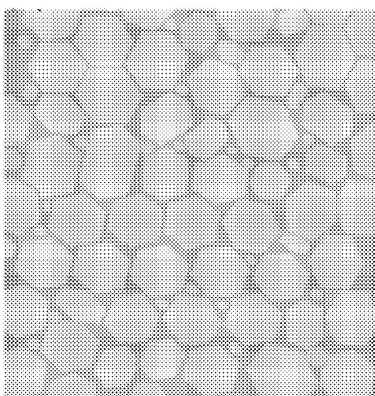


FIG. 5A

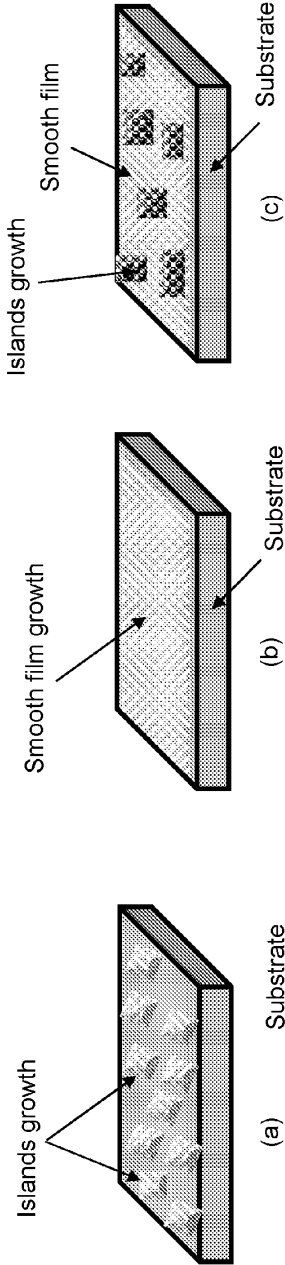


FIG. 5B

Surface energy,  $\gamma$  (J/m<sup>2</sup>)

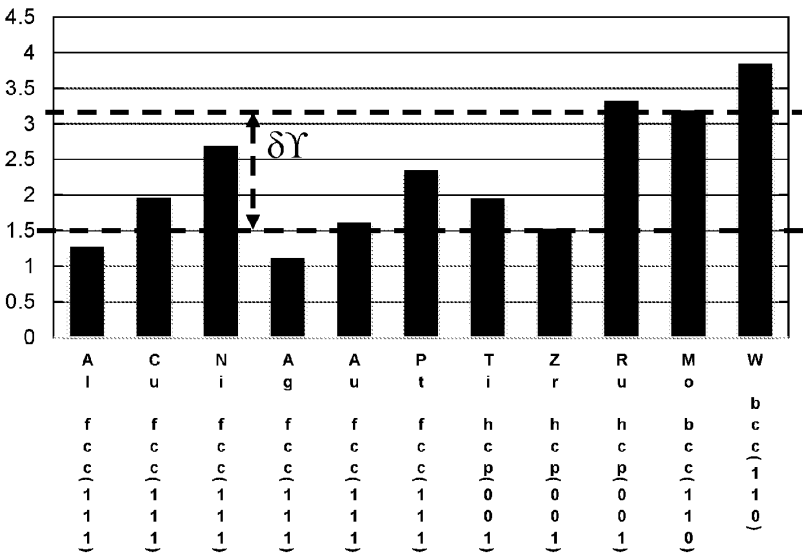


FIG. 6

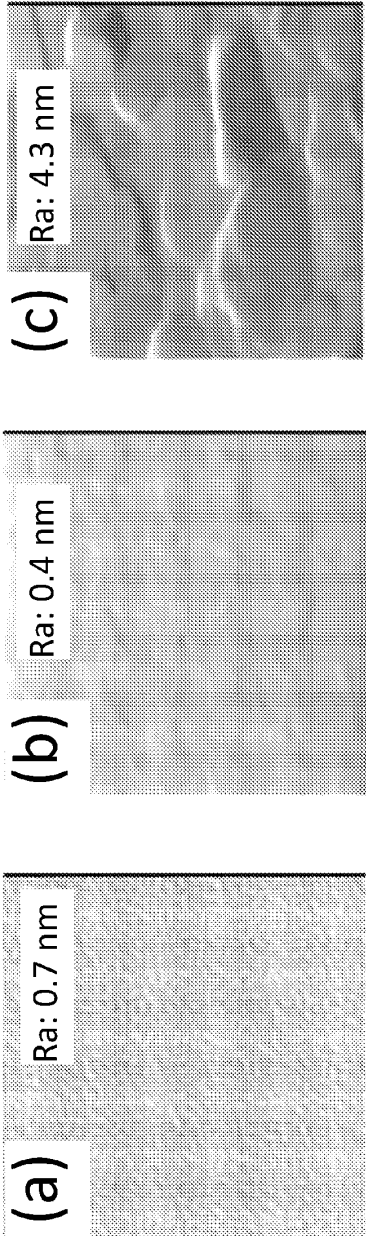


FIG. 7

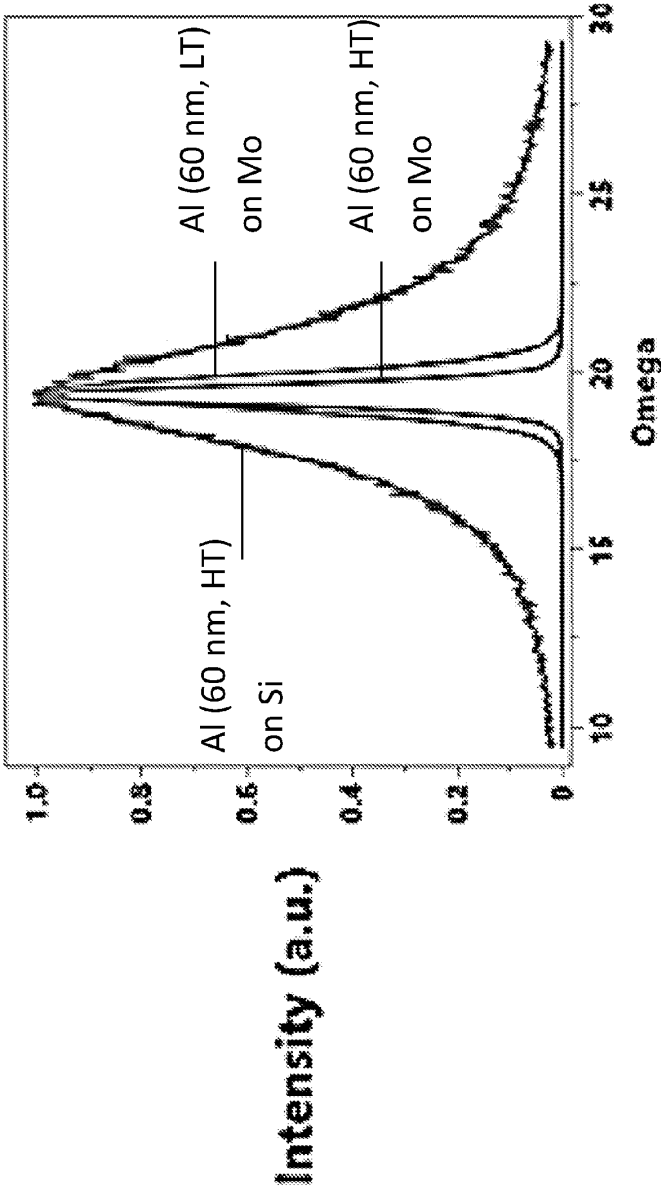


FIG. 8

| Film stack                               | X-ray rocking curve FWHM |          |
|------------------------------------------|--------------------------|----------|
|                                          | Mo (110)                 | Al layer |
| Al (60 nm, HT*)/Si (substrate)           | ---                      | 3.7°     |
| Al (26 nm, HT)/AlN (40 nm)               | ---                      | 1.4°     |
| Al (120 nm, HT)/AlN (40 nm)              | ---                      | 1.2°     |
| Al (60 nm, LT**)/Mo (200 nm)/AlN (40 nm) | 1.5°                     | < 1.2°   |
| Al (26 nm, HT)/Mo (200 nm)/AlN (40 nm)   | 1.5°                     | < 1.1°   |
| Al (60 nm, HT)/Mo (200 nm)/AlN (40 nm)   | 1.5°                     | < 0.7°   |

FIG. 9

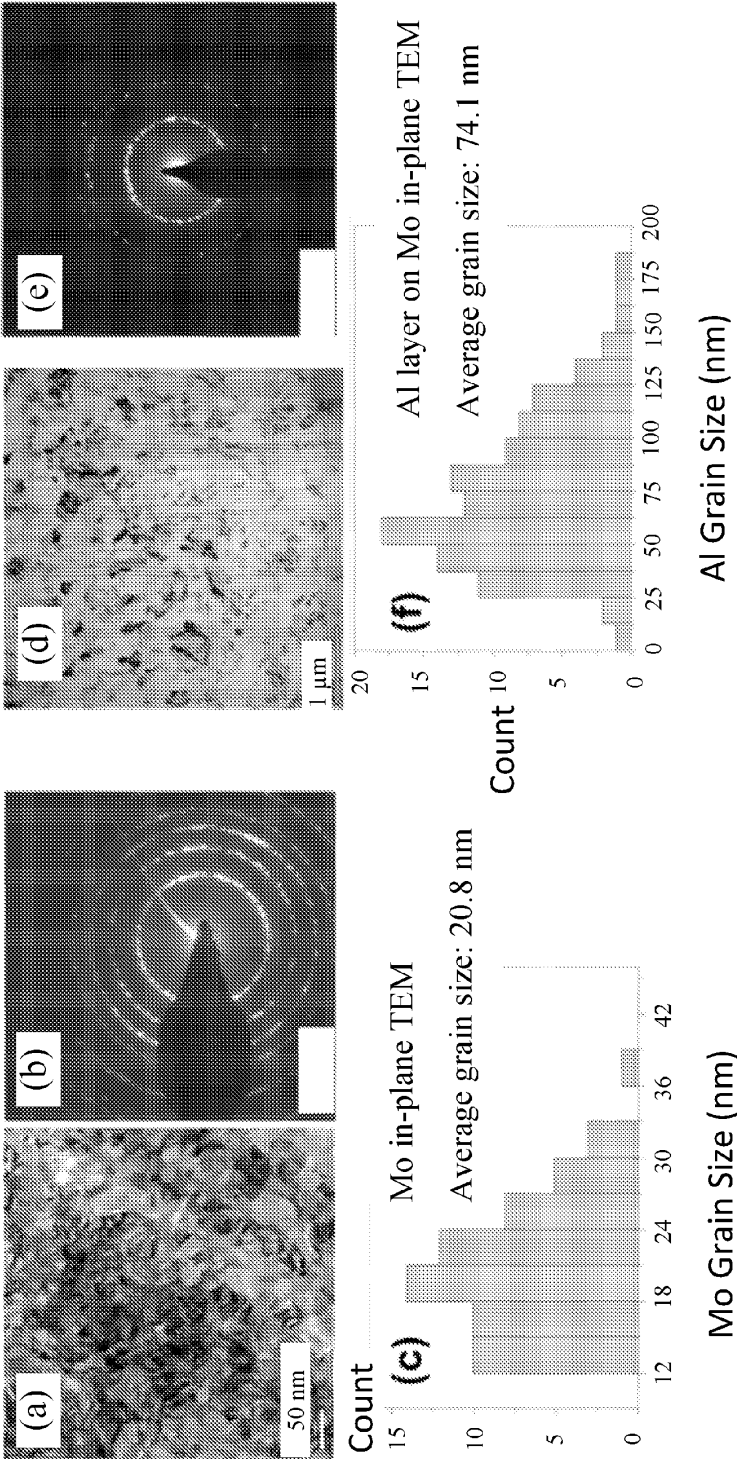


FIG. 10

| Film stack                               | X-ray rocking curve FWHM |          |
|------------------------------------------|--------------------------|----------|
|                                          | ScAlN (002)              | Al (111) |
| ScAlN (580 nm) directly on Mo, BKM       | 3.445°                   | -        |
| ScAlN (580 nm) on HT Al layer (20 nm)/Mo | 1.566°                   | 1.292°   |
| ScAlN (580 nm) on HT Al layer (32 nm)/Mo | 1.485°                   | 1.051°   |
| ScAlN (580 nm) on HT Al layer (46 nm)/Mo | 1.470°                   | 0.708°   |
| ScAlN (580 nm) on HT Al layer (60 nm)/Mo | 1.468°                   | 0.657°   |

FIG. 11A

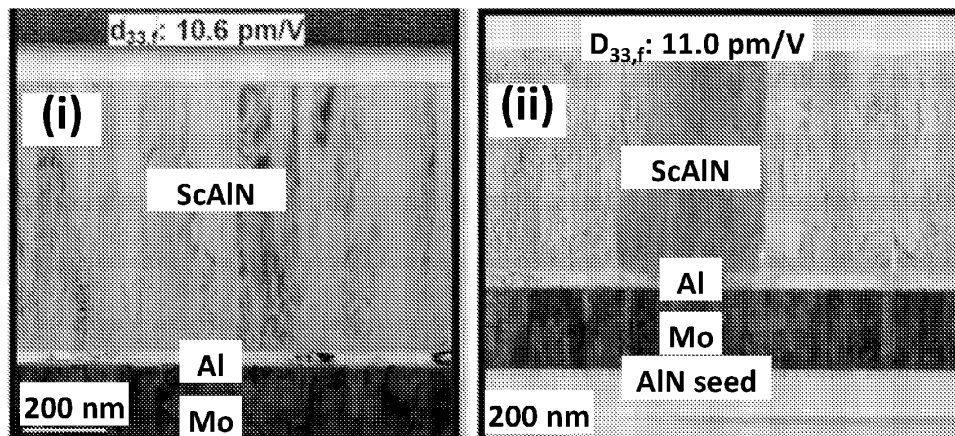


FIG. 11B

