

Development of a high resolution UV contact lithography process for the fabrication of interdigitated electrode arrays



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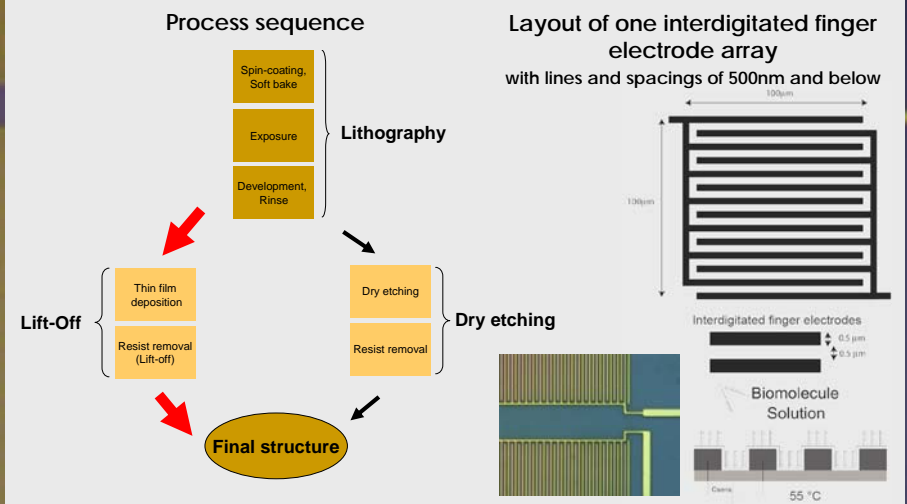
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abstract

We present recent results on UV contact lithography in the sub-0.5µm range. Using a high resolution master mask and a conventional broadband resist material we were able to fabricate submicron structures down to 200nm. A subsequent additive or subtractive pattern transfer (Lift-off and dry etching) was accomplished to visualize the structures and to show the ability of this technique.

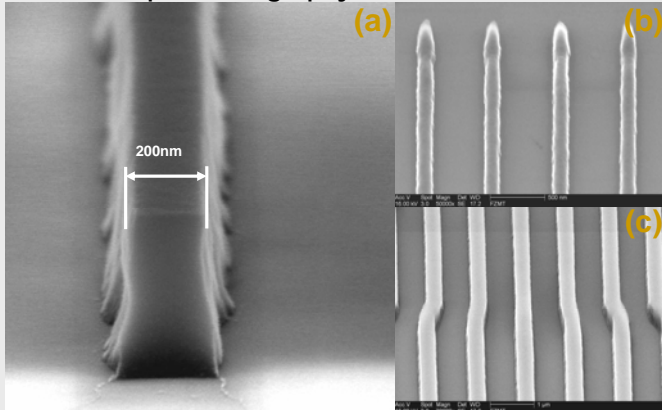
Concrete application is the fabrication of a capacitive biochemical sensor for detecting DNA bindings. This sensor includes large interdigitated electrode arrays with a half pitch of 500 nm or smaller.

experimental



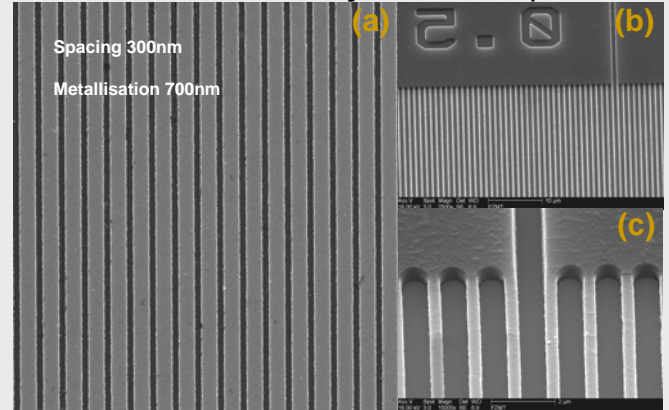
results & conclusions

UV contact photolithography in conventional UV-resist



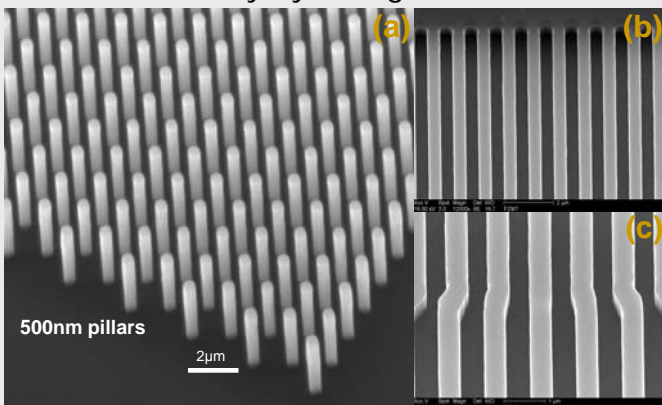
(a) Detail of a 200nm wide line profile in conventional photoresist AZ6612
 (b) 200nm resist lines in array (c) 500nm lines in arrays.

Pattern transfer by Lift-off technique



(a) Lines (700nm metal) and 300nm spaces
 (b and c) Metal deposited resist patterns immediately before Lift-off.

Pattern transfer by dry etching into silicon



3,6µm deep patterning of (a) array of pillars (500nm in diameter)
 (b) 500nm lines and spaces in varying duty ratio (c).

Equipment:

Exposure tool:
 conventional Maskaligner
 Broadband illumination 350W
 Vacuum contact mode

Resist material:
 Diluted AZ6612 (Clariant)

Metallization:
 1000Å Chromium
 (Evaporation)

Dry-Etching tool:
 ICP RIE with gas chopping

Conclusions:

We demonstrate a low cost photolithography technique by using a conventional contact maskaligner. The developed technique allowed us to draw high resolution patterns in conventional broadband resist materials down to 200nm by using a high resolution/quality chromium master mask.

We have also shown both, additive and subtractive pattern transfer possibilities through the obtained resist patterns.