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| --- |
| Objective |
| Batch name: Process template |
| This process flow is a guideline on how to spin coat, expose, and develop SU-8 on 100 mm substrates such as Si, SiO2 and Borofloat, using manual spin coater, maskless aligner and submersion developer.  This is an example process flow to be used as a template. It should contain:   * The objective of the process * Substrates/samples used in the flow - both actual samples to be processed (device wafers) and any monitor samples for the different process steps * The Process flow main processes and steps * Recommended: Figures illustrating the sample before and after each main process step   How to use this template (works only with the .dotx template file):   * Fill out the fields in the header * Add process steps by using Quick Parts under Insert (your cursor should be located at the beginning of the next (empty) step) Select the “Process Step” item * Other document parts can be inserted the same way: Substrates, Figures, etc. * The Content (TOC) on the last page is an option, but provides a nice overview for very long process flows |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Substrates | | | | | | | | | | |
| Substrate | Orient. | Size | | Doping/type | Polish | thickness | Box | Purpose | # | Sample ID |
| Silicon | <100> | | 100 mm | n (Phos.) | SSP | 525 ±25 µm |  | Device wafers | 2 | S1-S2 |
| Silicon | <100> | | 100 mm | n (Phos.) | SSP | 525 ±25 µm |  | Test wafers | 1 | T1 |

Comments: Number of wafers is for illustration only

|  |  |  |  |
| --- | --- | --- | --- |
| Figures | | | |
| Figure | Caption | Step | Figure |
|  | After SiO2 dep  Not part of this process flow example | 2.1 |  |
|  | After lithography | 3.5 |  |
|  | After BHF etch  Not part of this process flow example | 4.1 |  |
|  | After resist strip  Not part of this process flow example | 4.4 |  |
|  | After lithography  Not part of this process flow example | 5.6 |  |
|  | After metal deposition  Not part of this process flow example | 6.1 |  |
|  | After lift-off  Not part of this process flow example | 6.2 |  |

Comments:Click here to enter text.

|  |  |  |  |
| --- | --- | --- | --- |
| Step Heading | Equipment | Procedure | Comments |
| 1. Preparation | | | **All wafers** |
| * 1. Wafer selection | Wafer box | Take the wafers from the storage and put them in a wafer box. | Note the wafer IDs in the batch traveler |
| 1. SiO2 deposition | | | **All wafers** |
| * 1. Not part of this process flow example |  |  |  |
| 1. Lithography – standard | | | **All wafers** |
| * 1. Surface treatment | 250C oven  *Or*  Oven:  HMDS – 2 | At least 30 min. Overnight bake for better dehydration  Vacuum bake with no HMDS  **Recipe:**  09 | This treatment takes a long time |
| * 1. Syringe preparation | Fumehood 09 | Pour resist in syringe at least one day before use  Keep syringe in a resist storage cabinet | Mark syringe with resist type, your name, group name and date |
| * 1. Coat wafers | Spin Coater: RCD8 | **Resist:**  SU8-2075  **Automatic dispense system:**  4 ml ≈ 8 sec @ 2 bar  **Spin:**  Target thickness: 100 µm  Gyrset: Yes  2 step spin process:  Spreading: 700 rpm, 50 rpm/s, 25s  Thinning: 2000 rpm, 500rpm/s, 30s | Adjust dispense time and dispense pressure  Resist thickness can be measured on FilmTek or ellipsometer |
| * 1. Softbake | SU8 hotplate | **Recommended procedure from manufacturer:**   |  | | --- | | Step 1: ramp 5 min to 60°C, stay for 10 min | | Step 2: ramp 5 min to 90°C, stay for 20 min | | Step 3: ramp 1 hour to 25°C  The softbake step depends strongly on the mask structures | | Place wafers on SU8 HP immediately after spin coating  High baking temperature is known to produce cracks - especially in corners  If this is a problem, we recommend reducing the baking temperature and increase the time - a very rough rule of thumb is that if you divide the temperature by 2, the time should be multiplied with 10  If structures are critical, a test should be done |
| * 1. Exposure | Aligner:  MLA1  *Or*  MLA2 | **Design:**  Your design file  **Exposure dose:**  MLA1: 250 mJ/cm2  MLA2: 1000 mJ/cm2 (375 nm)  **Defocus:**  MLA1: 0  MLA2: -15 (pneumatic AF) | Further information is available on labadviser:  https://labadviser.nanolab.dtu.dk/index.php?title=Specific\_Process\_Knowledge/Lithography |
| * 1. Post exposure bake | SU8 hot plate | |  | | --- | | **Recommended procedure from manufacturer:**  Step 1: ramp 5 min to 60°C, stay for 10 min | | Step 2: ramp 5 min to 90°C, stay for 20 min | | Step 3: ramp 1 hour to 25°C  The post exposure bake step depends strongly on the mask structures | | Place wafers on SU8 HP immediately after spin coating  High baking temperature is known to produce cracks - especially in corners  If this is a problem, we recommend reducing the baking temperature and increase the time - a very rough rule of thumb is that if you divide the temperature by 2, the time should be multiplied with 10  If structures are critical, a test should be done |
| * 1. Develop | SU8 Developer bench | Develop in PGMEA  5 minutes in First Bath  5 minutes in Final Bath | Development time in first bath is minimum 1 minute per 20 µm resist thickness |
| * 1. Rinse | SU8 Developer bench | Rinse with IPA |  |
| * 1. Inspection | Optical microscope | Check pattern and alignment marks |  |
| 1. SiO2 etch | | | **All wafers** |
| * 1. Not part of this process flow example |  |  |  |
| 1. Lithography – Lift off | | | **All wafers** |
| * 1. Not part of this process flow example |  |  |  |
| 1. Aluminum pattern | | | **Only device wafers!!** |
| * 1. Not part of this process flow example |  |  |  |
| 1. Linewidth measurement | | | **All wafers** |
| * 1. Not part of this process flow example |  |  |  |

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