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| Objective |
| Batch name: Process template |
| This process flows is a guideline on how to use ESPACER on top of CSAR e-beam resist. |

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| Step Heading | Equipment | **ZEP spinning on Si, SiO2, SOI** | Comments |
| 1. Pretreatment | | |  |
| * 1. Surface treatment | BHF dip  *or*  HMDS | BHF dip for Si substrates (30 sec, H2O 5 min)  HMDS treatment for SiO2 and III-V substrates | Generally, pre-treatment is not recommended by ZEON. |
| 1. Spin coat of ZEP | | |  |
| * 1. Coat wafers | SSE Spinner, or Spin Coater LabSpin | **Resist:** CSAR  **Spin:** 60 sec @ 4000 rpm (~120 nm)  **Softbake:**  Si, SiO2, III-V: 2 min @ 180 °C (hotplate)  Pyrex: 5 min @ 180 °C (hotplate) |  |
| 1. Coat with ESPACER (only for non-conductive substrates) | | |  |
| * 1. Coat with ESPACER | Manual Spinner 1 | **Spin:** 60 sec @ 2000 rpm  **No Softbake** | Spun on like resist, no baking |
| 1. E-beam exposure | | |  |
| * 1. E-beam exposure | E-beam writer | Dose: 200 - 350 µC/cm2; a dose-test is required. See e-beam logbook for inspiration. | Dose depends strongly on substrate material, thickness of resist, critical dimension and load of pattern. |
| 1. Removal of ESPACER | | |  |
| * 1. Removal of ESPACER | Petribowl, e-beam fumehood | Rinse in H2O  Blow dry with N2. |  |
| 1. Development & Rinse | | |  |
| * 1. Develop-ment | Developer (E-beam) | Develop with X AR 600-54/6, 1 min  Rinse in IPA, 1 min  Blow dry with N2. | Dose depends on how you develop; make sure you develop in same manner as after dose-test. |
| 1. De-scum | | |  |
| * 1. De-scum | BHF dip | BHF dip for Si substrates (30 sec, H2O 5 min). | De-scum generally not recommended. If residues appear, optimize dose, development and rinse process. |
| 1. Postbake (in case of wet etching) | | |  |
| * 1. Postbake | Hotplate | Postbake: 2 - 3 min @ 100 - 140 °C |  |
| 1. Lift-off and Strip | | |  |
| * 1. Lift-off | Petribowl,  Fumehood | Remover 1165 in petribowl. |  |