Efficient removing of ZEP ebeam resist after dry etching

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Ebeam resist removal is an essential step for multi-layer lithography processes where a clean and contamination free surface is essential to avoid shadow etching patterns from resist leftovers. We show that a short O_2 plasma exposure followed by full NMP solution cycle remves the resist fully and leave the surface contamination free.

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Cleaning the surface completely from the etching masks is a crucial step when using several steps of lithography. We use ebeam resist ZEP to pattern the surface and the surface is cleaned for next steps of lithography. We observe that only using O_2 plasma is not effective enough and sometimes leaves residues as illustrated in the SEM picture in Fig1. Instead we have successfully tried exposing the resist to 1 minute of high power oxygen plasma machine (Tepla GigaBatch Plasma Microwave Oven) followed by 10 minutes of NMP wet etching solution. After NMP cleaning the samples are rinsed in water and also rinsed using SRD spin dryer tool and going through another rinse and drying cycle. We then expose the samples to 3 additional minutes of high power O_2 plasma. Our trials show that this technique removes al the residues of the ebeam resist. This cleaning technique can be extended for photolithography masks. We have tested this technique for removing AZ15XT resist and similar results were achieved.

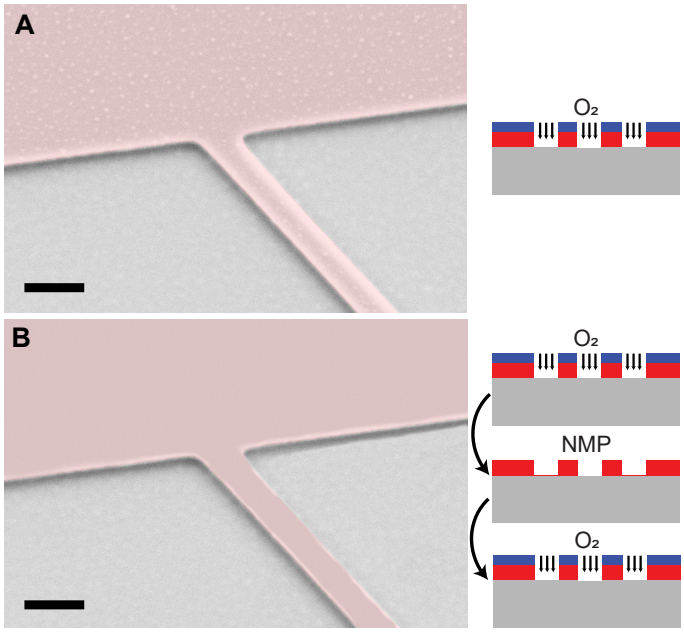

FIG. 1. **Comparison of resist cleaning strategies.** (A) Shows using only O_2 plasma will leave some residues as compared to (B) where an additional NMP cleaning intermidiating the plasma exposures will clean the surface completely. Scale bars correspond to 400 nm