Surface study of NaCl as a release layer for thin films

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Introduction

Release layers are needed when making micro targets with thin film coatings. Without a release layer, the coating would adhere to the glass slide or silicon wafer. Once a material is coated on to the release layer, the float off method is used on the slides to separate the target coating from the slide. Scitech precision have been making salt coatings as a release layers for a number of years. Even though these coatings occur numerous times a week, a thorough understanding of the coating is yet to be investigated. Understanding the surface roughness of the salt coating as well as how it is affected with time will help ensure more uniform coatings with less defects. It is also important to see whether any imperfections on the salt coatings are carried through to subsequent coatings.

Data collection

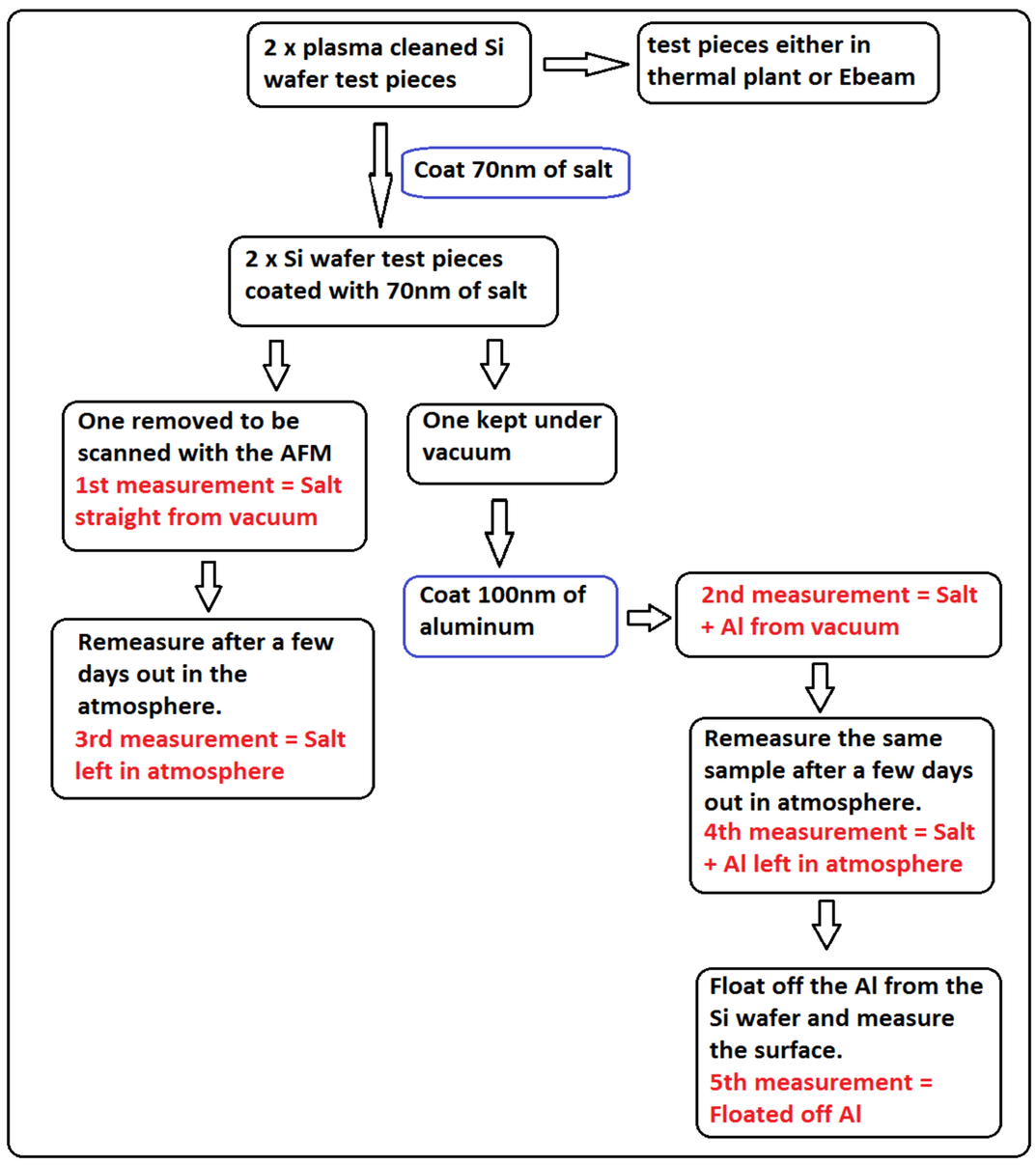

Figure 1. The data collection method. Blue shows the different coatings with red indicating the separate measurements.

The steps in figure 1 is repeated for as many times as needed for the test.

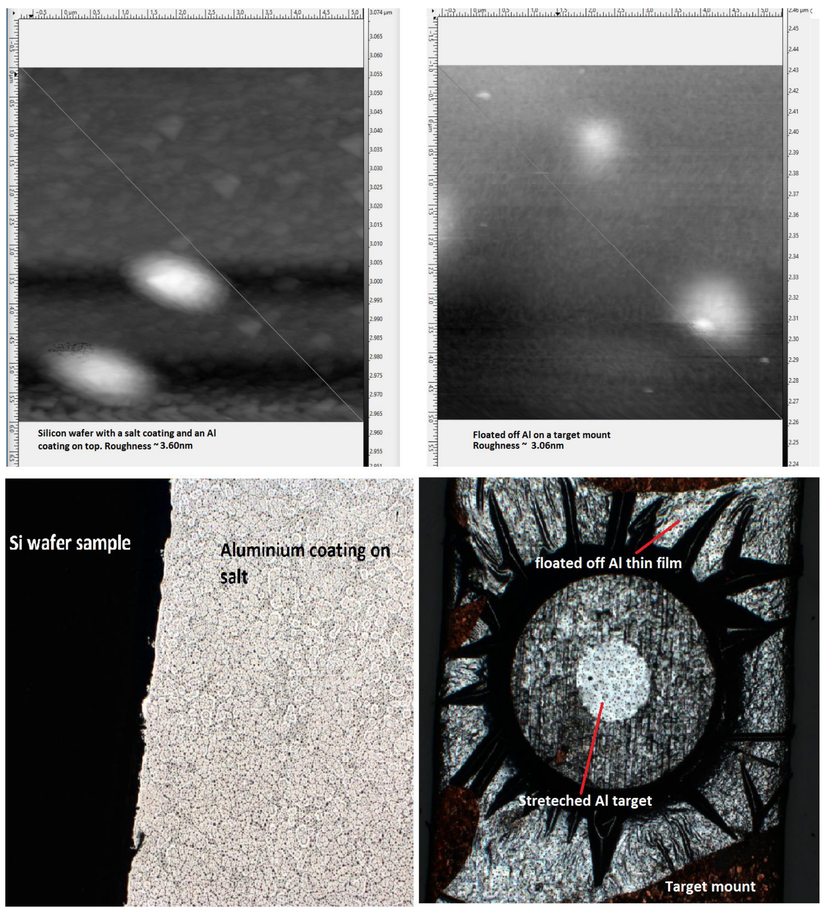

Figure 3 shows some AFM scans of a salt+Al coating and a floated off Al film. The bright white spots are just less than a micron and has a height of less than 20nm. These are believed to be the imperfections from salt slide passed on to the Al coating.

Figure 3. The AFM scans of a Si wafer with salt + Al coating and a floated off Al on a mount.

Data analysis and results

All the scans were done using an Atomic Force Microscope (AFM) in tapping mode. The scans were filtered and analysed using Gwyddion which is a software dedicated to study surface metrology. Figure 2 below shows some AFM scans of the first four measurements.

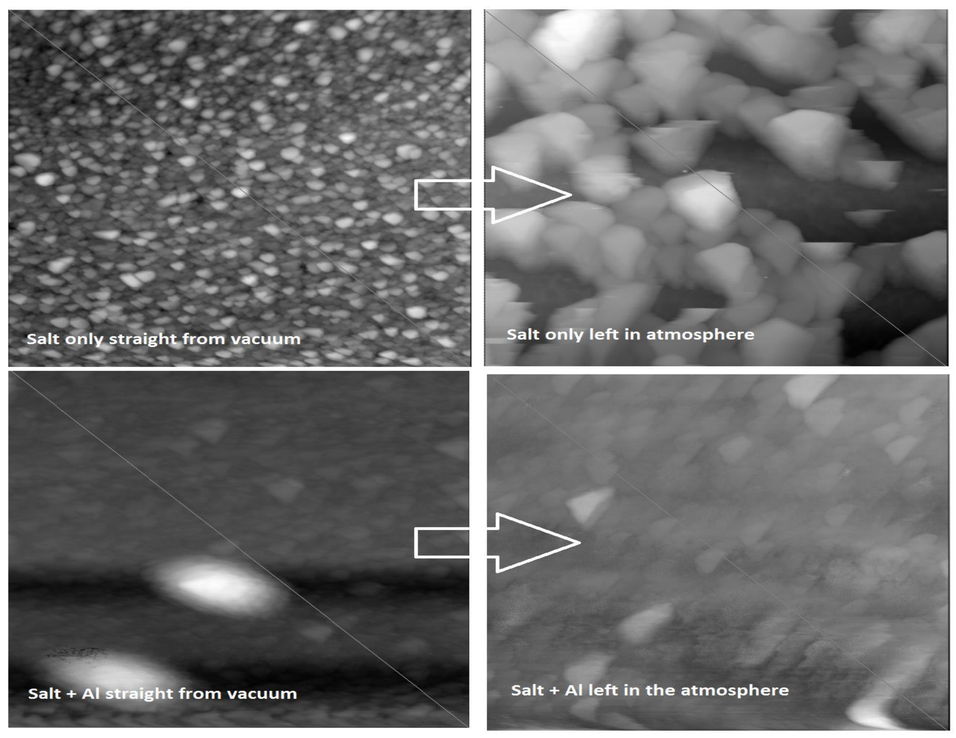

Figure 2. The surface of the salt and Salt+Al sample in different stages. Note that the scan areas for before and after are not identical.

The average roughness of the salt coatings from vacuum on the E-beam was about 2 times more than the thermal plant. The Salt+Al from the vacuum were almost the same. The graph below shows the average roughness for the different measurements, for both plants.

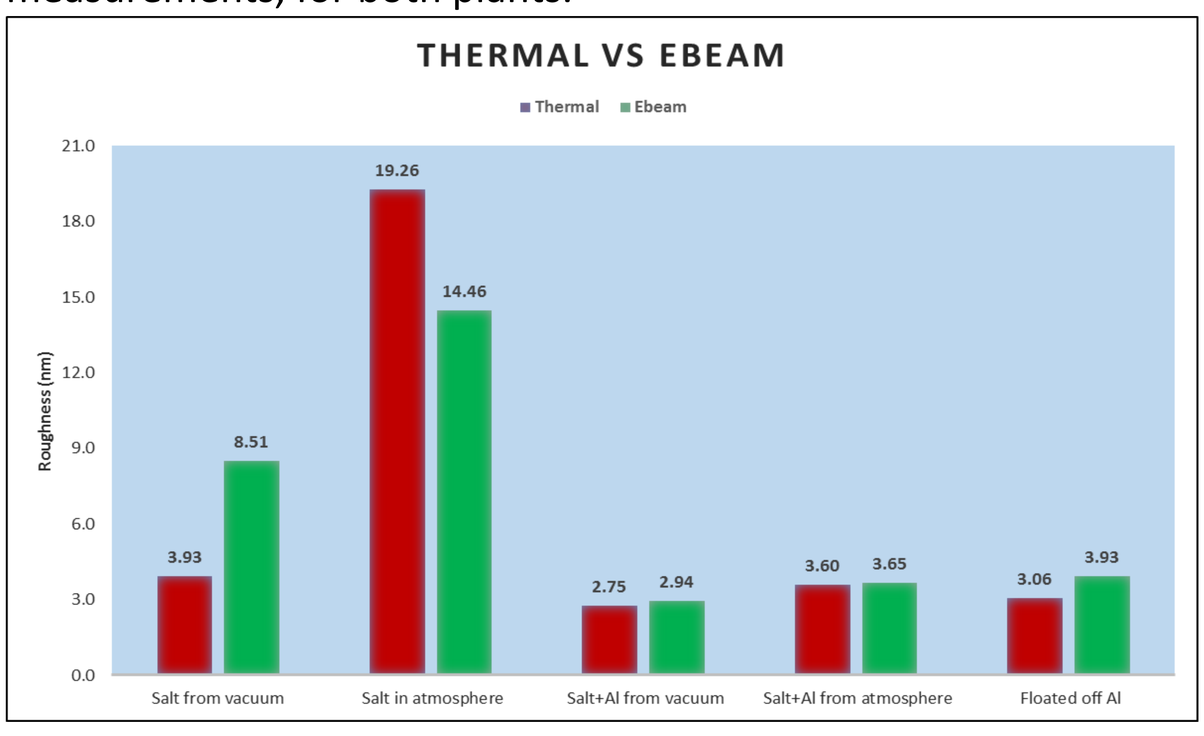

Table 1. The roughness value comparison of thermal and Ebeam

Conclusions

Salt and Salt+Aluminium coatings were carried out using both an Ebeam and a thermal plant. The Salt on the slide crystallises as its left exposed to the moisture in the atmosphere increasing its roughness. Both the thermal and the Ebeam seem to give very similar flatness for the floated off Al target foil. Further work will involve using varied salt thicknesses at varying rates.