

Takachi Etch Data

May 15, 2023

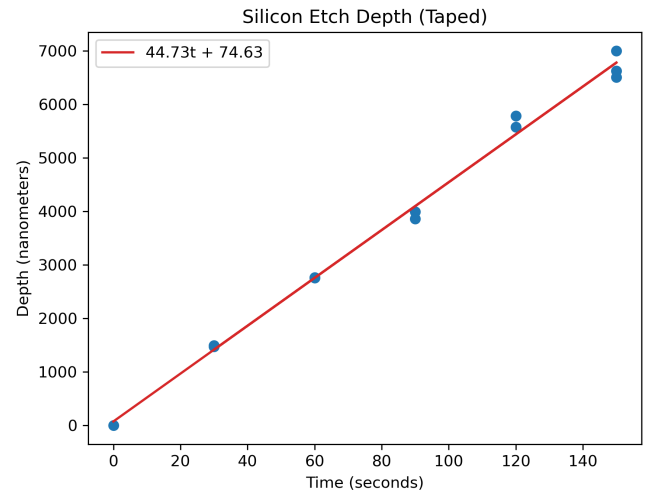
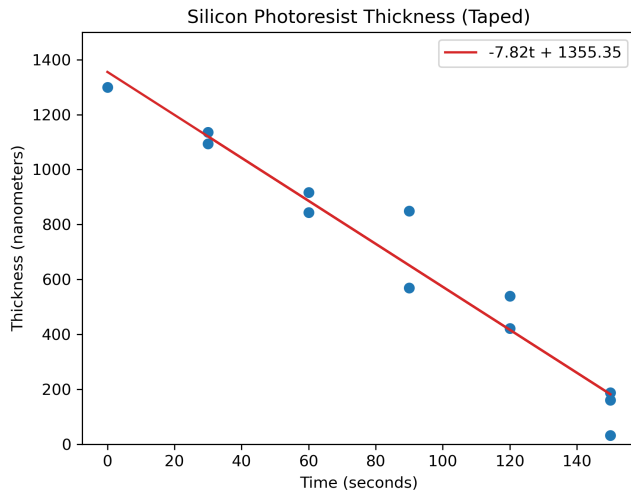
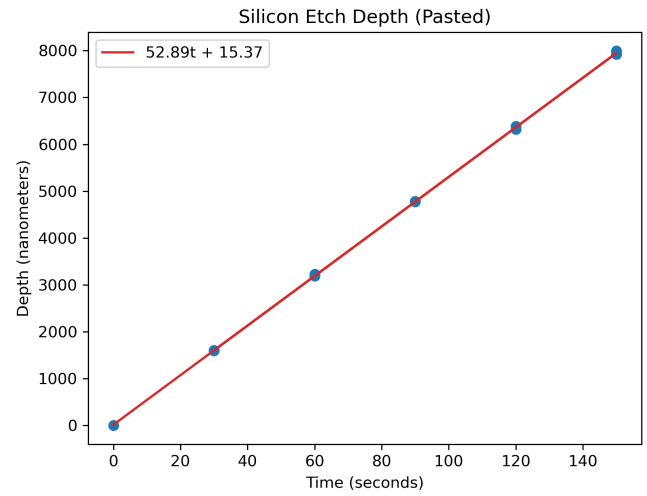
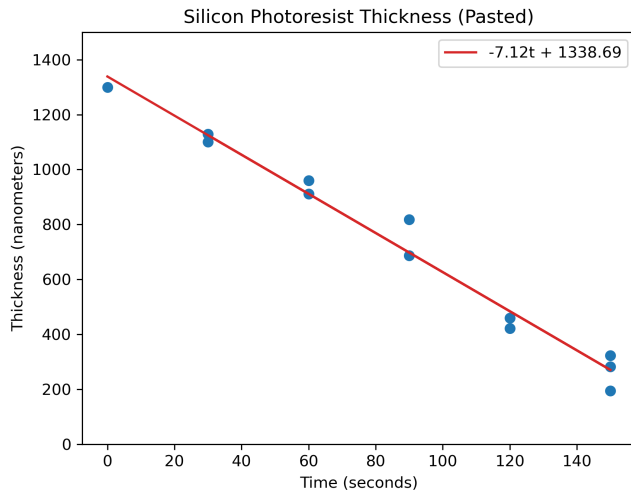
Introduction. Etch rates for the Takachi have been measured for Si, SiO₂, and Si₃N₄. The samples were patterned with S1813 photoresist with a thickness of approximately 1.3 μ m. They were then etched using standard recipes (detailed in their respective sections) in increments of 30s. Finally, the etch depth and photoresist thickness for each sample were measured using the Dektak. This data gives us information about etch rate and selectivity.

Each etching was done with a pair of samples. One sample was taped to the sapphire carrier wafer with Kapton tape, and the other was pasted to the sample with thermal paste.

Multiple sets of samples were done at widely separated times in order to screen for any potential temporal fluctuation in etch rates. No such fluctuation was found; the etch rates seem to be consistent across trials.

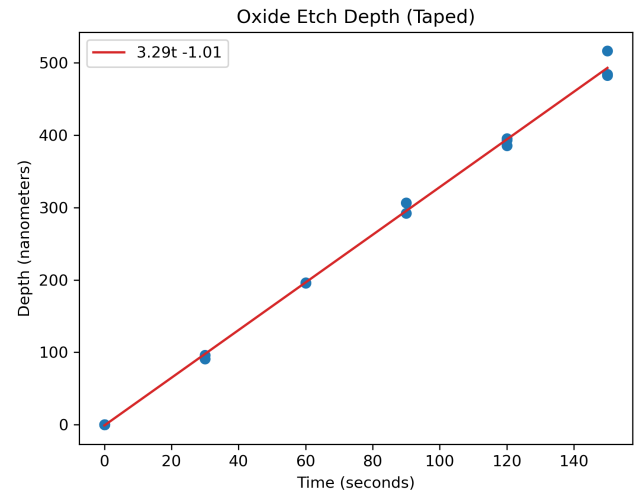
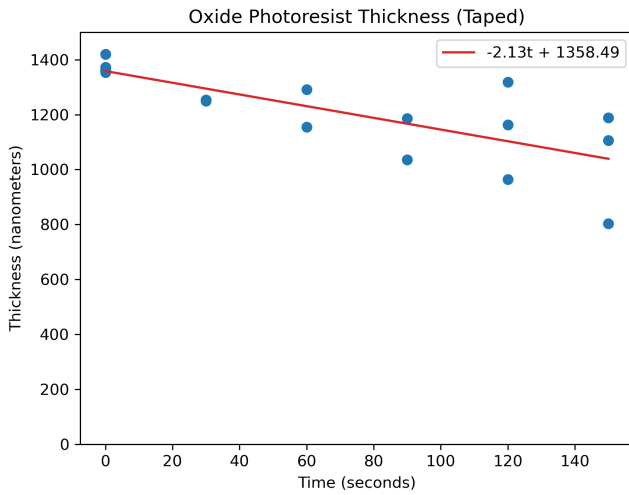
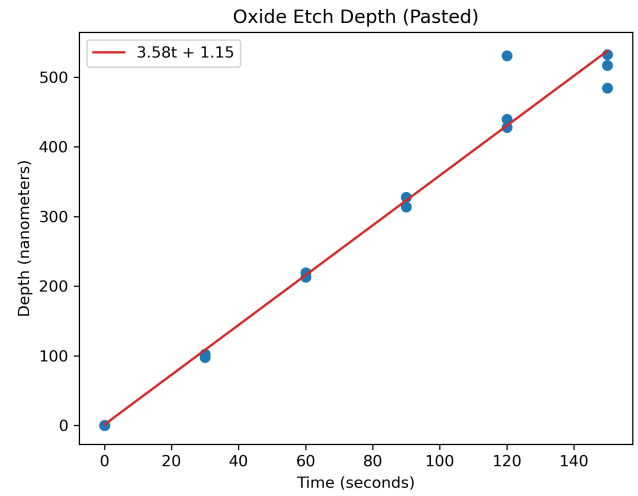
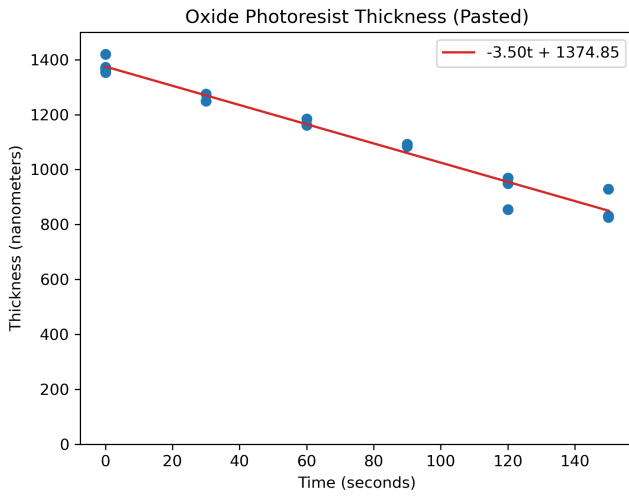
Silicon. Silicon samples were etched with power levels of 50W RF and 600W ICP. Gas flow rates were 100sccm SF₆, 30sccm Ar. Pressure was 10mTorr.

The etch rate was determined to be around 3,180nm/min and selectivity versus S1813 was around 7.6.



Oxide. Oxide samples were etched with power levels of 100W RF and 400W ICP. Gas flow rates were 50sccm CHF₃, 5sccm O₂. Pressure was 5mTorr.

The etch rate was determined to be around 210nm/min and selectivity with S1813 was around 1.



Nitride. Nitride samples were etched with power levels of 30W RF and 1200W ICP. Gas flow rates were 50sccm CHF_3 , 5sccm O_2 . Pressure was 17.5mTorr.

The etch rate for a pasted sample was determined to be around 138nm/min and selectivity with S1813 was slightly greater than 1.

Note that the photoresist thickness data for the taped Nitride samples is very funky. This has been observed in multiple trials, only for Nitride, and only for taped samples. We are investigating.

