Silicon etching studies using tetramethly ammonium hydroxide

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Etching of silicon plays an important role in the field of micromachining. Both inorganic and organic solutions are used for this purpose. Some of the solutions used for this purpose are potassium hydroxide (KOH), Ethylene Diamine Pyrochatechol (EDP) and Tetramethly Ammonium Hydroxide (TMAH). One of the problems of using KOH is that potassium ions are potential contaminants in silicon.

In this work, a study on the etch rates of (100), (110) and (111) silicon using TMAH has been performed taking into consideration two parameters namely temperature and solution concentration. Etching was carried out at three temperatures namely 70, 80 and 90 °C using three different concentrations. The concentration of the solution was adjusted by diluting it with de-ionized water. It was observed that the increase in concentration decreases etch rate whereas the increase in temperature causes an increase in etch rate. It was also observed that etch rate for (110) is more than (100) at the same condition. A study was also conducted on the surface roughness. It was observed that roughness is highly dependent on the solution concentration and temperature.