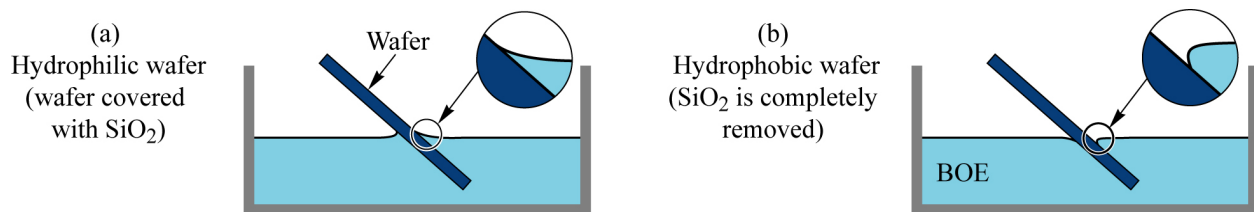


Wet chemical etching of the Si/SiO₂ material system using BOE

- BOE etches SiO₂. BOE does not etch Si. Thus SiO₂ layers on Si can be selectively removed with BOE.
- BOE is an acronym and stands for “buffered oxide etchant”.
- BOE is used in the IC industry for wet chemical etching of SiO₂. BOE is commercially available from chemical supply companies.
- What is BOE chemically? BOE consists of a mixture of a NH₄F aqueous solution (40 % concentrated) of and an aqueous solution of HF (50 % concentrated). The ratio of the two aqueous solutions is NH₄F/HF = 5 / 1 (by volume).
- The etch rate of standard BOE is 100 nm/min
- SiO₂ is hydrophilic. Why? (Both SiO₂ and H₂O are polar molecules. Therefore the materials attract each other)
- Si is hydrophobic. Why? (H₂O is a polar molecule. However, Si is non-polar. Therefore the two materials do not attract each other)
- One can easily tell when all SiO₂ has been etched away, because the surface changes from hydrophilic to hydrophobic.
- The figure below shows a hydrophilic and hydrophobic surface



- Consider the words:
“-philia”:
Audiophilia - love of recorded sound; Bibliophilia - love of books; Europhilia - love of Europe;
Sinophilia - love of China;
“-phobias”:
Claustrophobia - fear of confined spaces; Chemophobia - the fear of chemicals or working with chemicals; Hydrophobia - fear of water; Photophobia - fear of light; Xenophobia - fear of strangers or foreigners