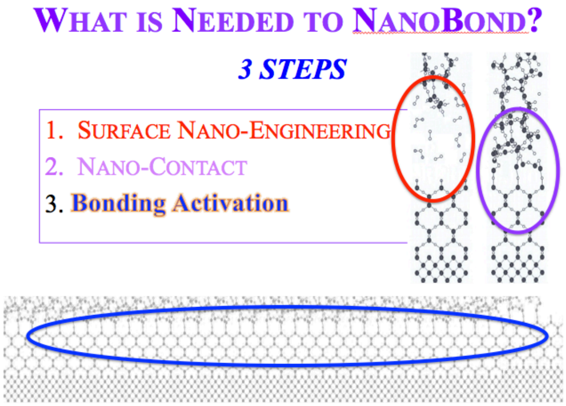
The goal of NanoBonding^{TM} is to form molecular cross-bridges at the interface.



WHAT IS NEEDED TO NANOBOND?

3 STEPS

1. SURFACE NANO-ENGINEERING
2. NANO-CONTACT
3. **Bonding Activation**

Figure 1: Details NanoBonding^{TM} process

This is accomplished by creating a hydrophilic GaAs surface and a hydrophobic Silicon surface.

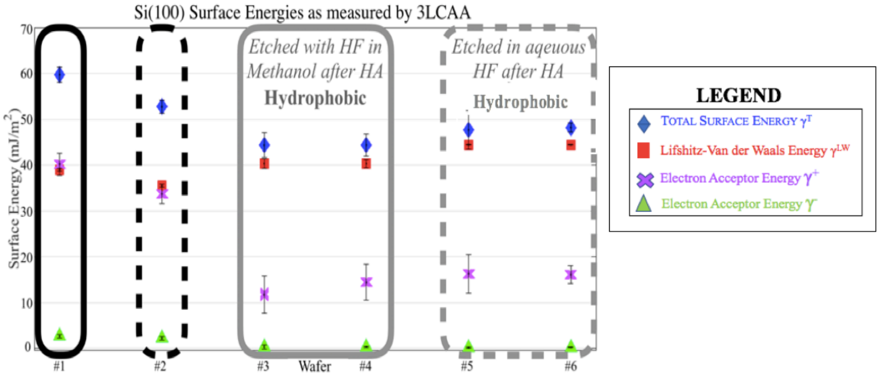


Figure 2: 3LCAA surface energy measurements for Si(100)

The figure above displays the effect of etching on the surface energies of $y^{T,}$, y^{LW}, y^{+} and, y^{-} Si(100) surfaces. As received Boron-doped p- Si(100) wafers are hydrophilic before etching and made hydrophobic when etched with the Herbots-Atluri (HA) process as evidenced by the decrease in y^{T} and the increase in y^{LW}. After etching, y^{LW} is 98% of y^{T}, implicating that etching makes the surface less interactive and more hydrophobic.

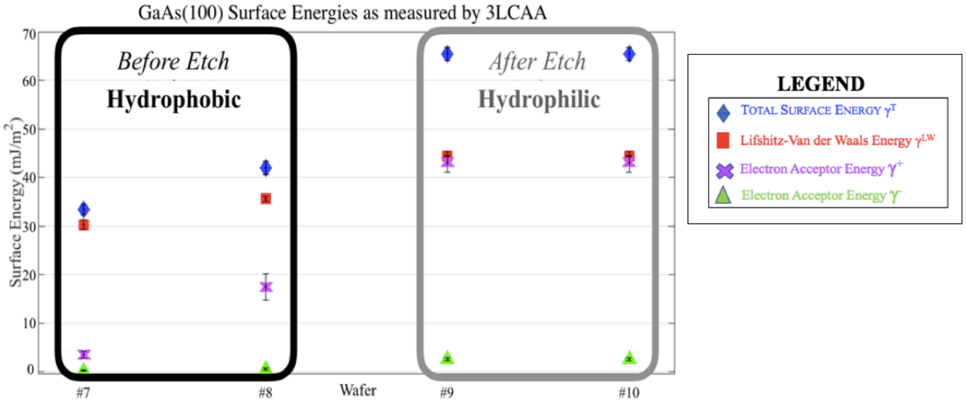


Figure 3: 3LCAA surface energy measurements for GaAs(100)

Figure3 above displays the effect of etching on GaAs(100) surfaces. As received Te n+ doped GaAs(100) wafers are hydrophobic before etching and are made more hydrophilic by a proprietary passivation based etch as evidenced by the increase in y^T and the decrease in y^{LW}. After etching, y^{LW} is only 66% of y^T, implying that etching makes the surface more interactive and more hydrophilic.

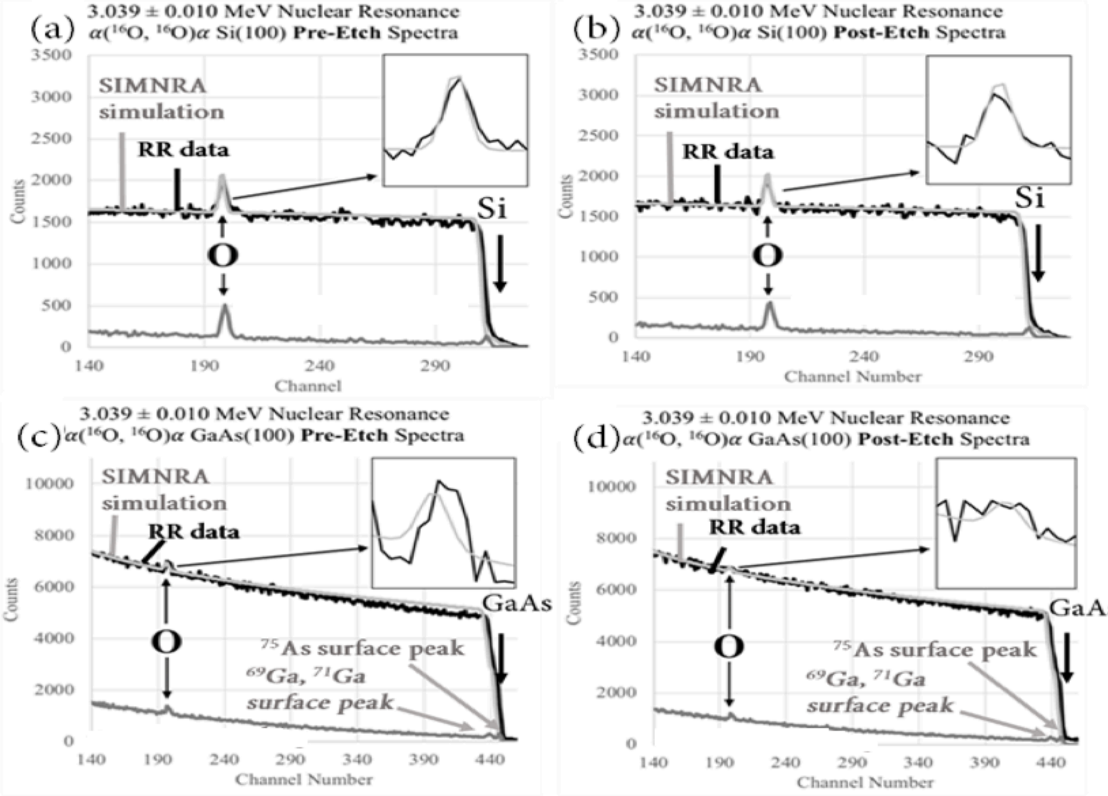


Figure 4: IBA Spectra for Si(100) and GaAs(100) with channeling along <111> crystal axis.

Fig 4(a) (b), (c) and (d) display each three IBA spectra at the oxygen maximum resonance energy of 3.049 ±0.010 MeV, obtained by overlaying three spectra at the same energy on the same sample as follows: a Rotating Random geometries , a SIMNRA simulation, and <111> axial Channeling. The SIMNRA simulations and RR data match within 1% the oxygen counts, which are identical in RR and <111> channeling. Aqueous HF etch if found to reduce the amount of oxygen on the Si(100) surface by 11.6% . A proprietary etch reduces the amount of oxygen on GaAs(100) by 49.1% and stabilize that amount for days.