

BST AND DELTA/SUPERLATTICE DOPING PROCESS

PROJECT STEPS

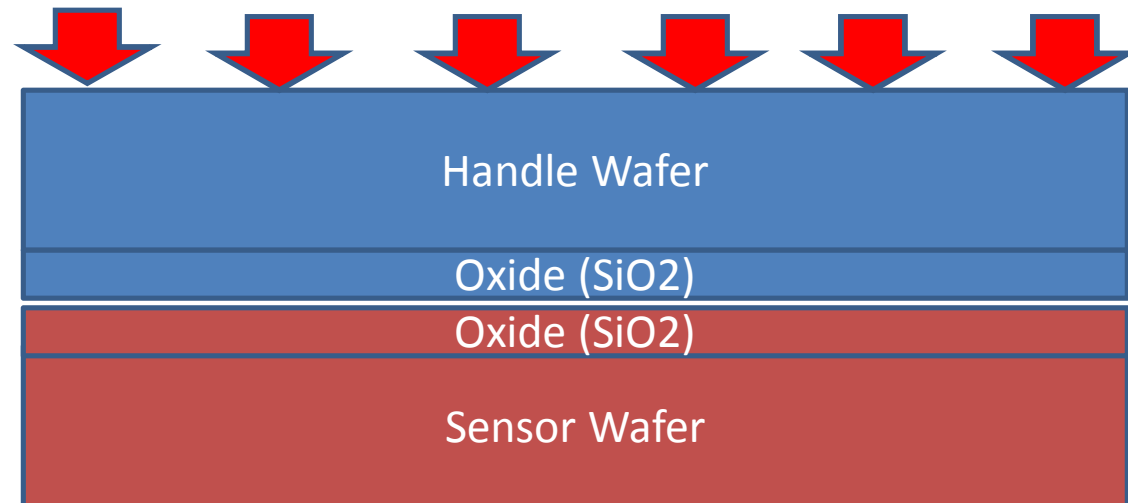
- **Project definition**
- **Handle wafer attach**
- **Back side thinning (BST)**
- **Delta and superlattice Doping (SLD)**
- **Antireflective coating (AR)**
- **Opening the pads and streets**
- **Dicing, packaging and testing**

DEFINING A PROJECT AND COSTING

- **Alacron and customer collaborate in defining the desired result in terms of wavelength, QE, power of illumination, and desired lifetime**
- **Alacron interacts with the various vendors and provides a quote to the customer.**
- **Customer places order, and provides the wafers.**

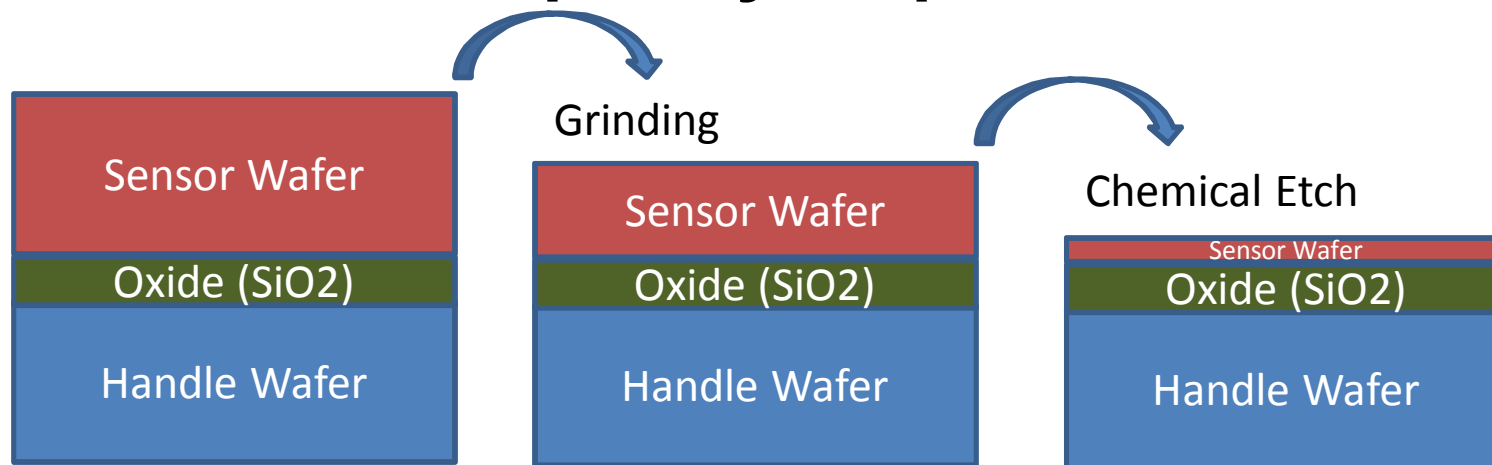
ATTACHING THE HANDLE WAFER

- The handle wafer is attached to the sensor wafers by oxide to oxide bonding
 - Thickness of native oxide on sensor wafer
 - Flatness of sensor wafer
 - Heating



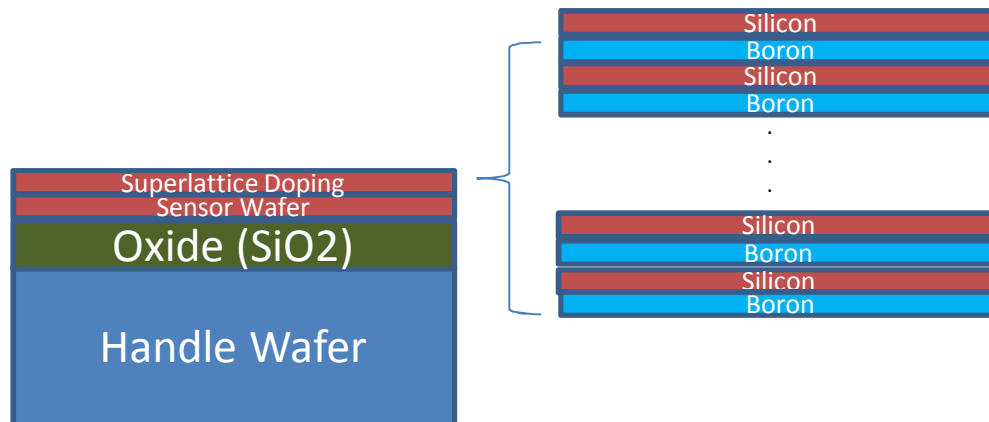
BACK SIDE THINNING

- **Grinding**
- **Chemical Etching**
 - **Multistep process to obtain final desired thickness**
 - **Final thickness is partly dependent on desired frequency response**



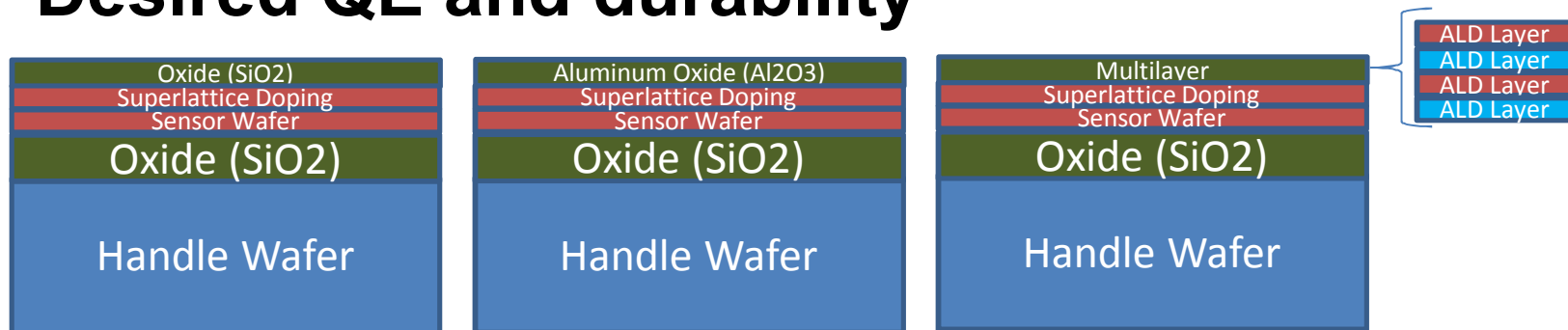
SUPERLATTICE DOPING

- **Superlattice doping**
 - One to six Boron and Silicon layer deposited by Silicon MBE
 - Multistep process
 - Number of layers is a trade off between MTF and durability at the target frequency and power
 - Requires temperature tolerance of sensor wafer



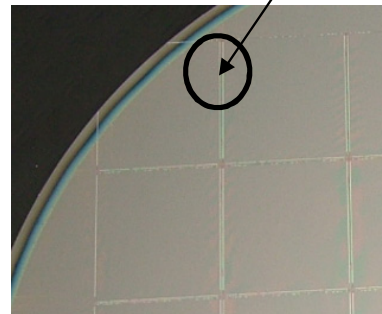
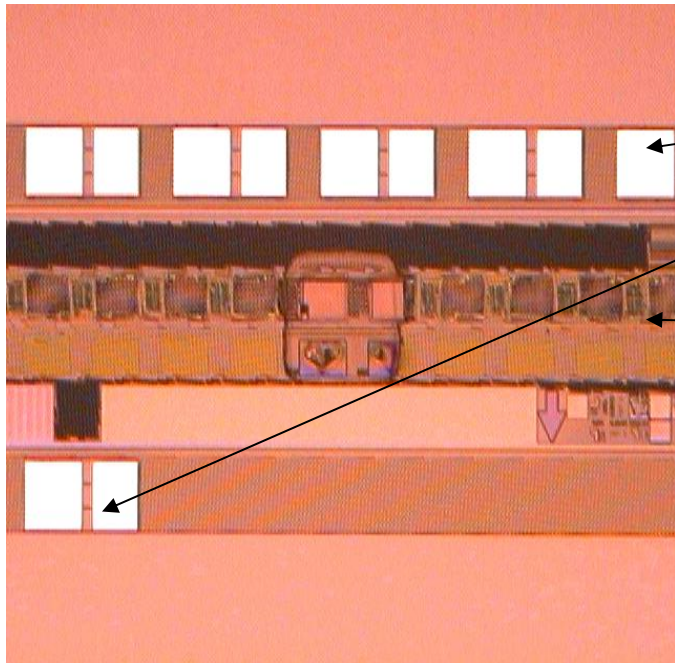
ANTIREFLECTIVE COATINGS

- Can be directly deposited or formed, e.g. Native oxide
- Atomic layer deposition (ALD) is often used
 - Aluminum oxide, Magnesium fluoride, Silicon dioxide
 - Multi-layer AR coatings
- Desired operational wavelength passband /stopband
- Desired QE and durability



PAD AND STREET OPENING

- Masked chemical etching
- Multiple masks may be needed depending on sensor architecture



• Pads

• Dicing Streets

DICING AND PACKAGING

- **Resulting die are sawed**
- **Die are placed in package, wire bonded**
 - Die have mirrored pin out.
 - Package changes are often needed
- **Packages are closed**
 - Tape on glass
 - Type of glass
- **Device are tested to determine yield**

