Direct bonding chips with tweezers

When bonding plasma activated surfaces together, it is important to apply a sufficient amount of force to the chips when pressing them together to properly initiate the bond. Pressing with tweezers is an easy and effective way to do this. However, since it is a subjective process, it can be difficult to replicate. Below, we discuss our tweezer bonding process for plasma activated chips.

It is helpful to start with two chips of different sizes if aligning the chips manually, to ensure the top chip's film surface is entirely in contact with the bottom chip. We use a 5x5 mm SOI chip as our top chip and a 10x12 mm LNO on insulator chip as our bottom chip. The bonding is done in a plastic dish.

After dipping the chips in DI water for 30 seconds post plasma activation and blowing dry with N_2, place the chips face up in the dish. Carefully pick up the smaller chip with tweezers and place it face down on the larger chip, as shown in Figure 1a. Once the chip has been adjusted to the desired position, press down firmly on the center of the top chip. With a second pair of tweezers, press down firmly on other areas of the backside of the chip off the center, approximately 10 times, as shown in figure 1b. Once this is complete, pick up the larger chip with one pair of tweezers and clamp down on both the top and bottom chips with a second pair of tweezers. With both pairs of tweezers, clamp down on different areas of the chip to ensure that the entire bond area has received roughly the same amount of force applied, as shown in figure 1c. Once this is complete, the chips are ready to be annealed.

Link to video demonstrating bonding process

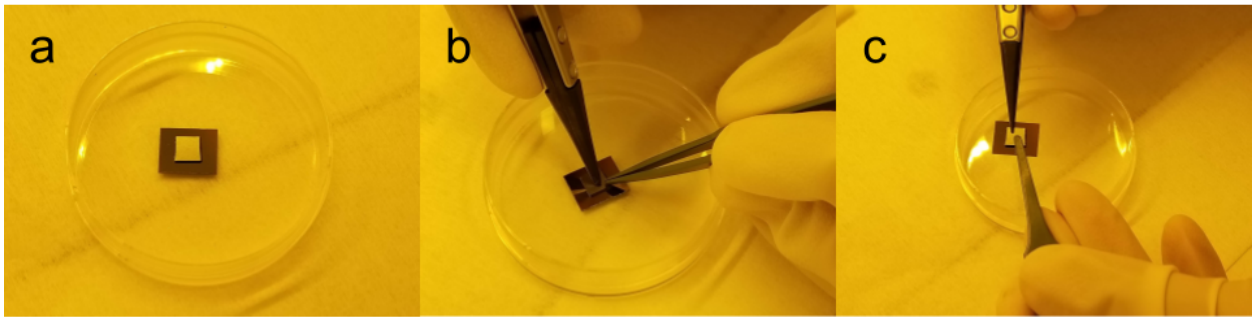

Figure 1. Images outlining the tweezer bonding process. (a) SOI chip sitting face down on a LNO chip. (b) Pressing down on the center of the top chip with one pair of tweezers while pressing on the edges with a second pair of tweezers. (c) Picking up the chips and clamping them together with two pairs of tweezers.